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Lynch, Michael G.; Ulrich, Charles Howard

Monterey, California. Naval Postgraduate School

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REQUISITION THROUGHPUT TIME SIMULATION AT NAVAL SUPPLY CENTER SAN DIEGO

Michael G. Lynch

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Monterey, California

THESIS

REQUISITION THROUGHPUT TIME SIMULATION
AT
NAVAL SUPPLY CENTER SAN DIEGO

by

Michael G. Lynch
and
Charles H. Ulrich

Thesis Advisor: F. R. Richards

March 1973

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Requisition Throughput Time Simulation at Naval Supply Center San Diego

by

Michael G. Lynch
Lieutenant Commander, Supply Corps, United States Navy
B.S., University of Rochester, 1962

and

Charles H. Ulrich
Major, United States Army
M.E., University of Cincinnati, 1960

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN OPERATIONS ANALYSIS

from the

NAVAL POSTGRADUATE SCHOOL
March, 1973

Library
Naval Postgraduate School
Monterey, California

ABSTRACT

A computer model which simulates the processing of requisitions for standard stock material at NSC San Diego is constructed. The model is designed to enable NSC San Diego to determine those work stations which are bottlenecks and to view the effects of changes in total throughput time caused by changes in manpower resources and administrative procedures. Output from the computer simulation model includes an analysis of throughput time by issue priority group, and summary data on work center utilizations and delay times. Total throughput time is compared to Uniform Material Movement and Issue Priority System time standards. The automated materials handling system seems to achieve its goals; however large delays are seen to occur in the staging area where items await local transportation. These delays are reflected most critically in the statistics for the percentage of issue priority group two material shipped on time. Variations of the basic model were analyzed. The combination of a six day workweek and an increased local delivery schedule resulted in substantial improvement.

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I. INTRODUCTION

The Commander, Naval Supply Command, issued in April, 1968, a revised General Objective No. 1:

> NAVSUP will provide optimum support in appropriate categories of supplies and services, responsive to the requirements of the Navy (including project managers), other supported services and agencies, and allied nations under the international logistics programs. For general material, optimum support is that which maximizes requisitions satisfied within the time frame required by the requisitioner. For technical material, optimum support is that which minimizes downtime of weapons systems due to lack of repair parts and components.

In order to minimize downtime in a terminology common throughout the Navy, the Chief of Naval Operations and the various Systems Commanders have decided upon operational availability (A_O) as the primary measure of readiness.

$$A_O = \text{OPERATION AVAILABILITY}$$

$$= \frac{\text{UPTIME}}{\text{TOTAL TIME}}$$

$$= \frac{\text{MTBF}}{\text{MTBF} + \text{MRT} + \text{MADT} + \text{MSRT}}$$

where:

MTBF = Mean Time Between Failure
MRT = Mean Active Repair Time
MADT = Mean Administrative Delay Time
MSRT = Mean Supply Response Time

The MSRT is the area of responsibility for the Naval Supply Systems Command. The implementation of GO #1 has to be achieved in conjunction with GO #2 which states:

> NAVSUP will give priority attention in planning and management to the effect of its actions on the end purpose-the support of combat and strategic deterrent operations-and, subject to this overriding objective, will allocate and expend available resources in a manner to optimize cost effectiveness.

The supply system has the responsibility of minimizing the time a user has to wait for his needed material. In this manner, time saved is a measure of the worth of the supply system. Prichard and Bussell [Reference 1] enjoined all managers and supervisors to try to measure the worth of supply system functions and stressed the importance of seeing the "link" between the projects and functions that are performed and the reduced response time called for by General Objective #1.

The Naval Supply Center, San Diego, is tasked with providing supply and support services to assigned Fleet units and shore activities in the southern 11th Naval District. NSC San Diego provides logistic support to 118 ships home-ported there, the largest number of home-ported ships at any stock point in the supply system. Two hundred and sixty-nine shore activities, 57 of which are Navy, receive supply, accounting and computer services from NSC San Diego since it is the only governmental supply activity in the area. The nearest DSA activity is 600 miles away. The main operating areas comprising NSC San Diego are the Broadway Compound in downtown San Diego; the National City Annex located at the Naval Station five miles south of the Compound; and the Point Loma Annex across San Diego Bay.

This report presents the results of a computer simulation of the processing at NSC San Diego, of customer requests, both point of entry and autodin referred transactions, for material that is available at the Center. To move in the

direction of General Objective #1, NSC San Diego is concerned with minimizing throughput time per customer request subject to the resources available. The simulation provides a method to measure throughput time for each of the issue priority groups of requests for material available, to observe and measure the delays incurred by a transaction at each step of the throughput process, to determine utilization rates for each processing work station, and to evaluate the change in throughput time that can result by varying such input parameters to the model as management policies, customer demand characteristics, and resources available at the Supply Center.

II. THE MODEL

A. SYSTEM TO BE MODELED

Naval Supply Center, San Diego, receives over 100,000 requests monthly, most of which have to be processed for immediate issue from the Center. Presently, NSC San Diego issues 75,000 items monthly on its $120,000,000 inventory investment in 125,000 line items. The twelve Servemarts at the Center issue another 120,000 items monthly with a 33,500 line item inventory of $1 million.

This output portion of the system is the responsibility of the Material Department, which oversees the physical handling of the material through delivery to the customer. Both the Broadway Compound and the National City Annex operations issue, pack, and ship or deliver material. The Broadway Compound concentrates its efforts on binned items, such as resistors, tubes, nuts and bolts; fresh and frozen provisions; and some bulk materials. The heart of the operation is the automated materials handling system which automatically transports an issued item to a packing line. A lotting report, output from the computer, translates requisitions into issue documents, arranges them to conform to the storage pattern in the warehouse and prints the packing line designation on the issue document as well.

These computer printed picking tickets are then delivered in batches to the warehousemen for making issues on the

available material. The material is placed in a tote pan which has signal settings on its side; the settings are read by "electric eyes" which route the pan along a conveyor system running through the warehouse to the packing building. Thus, a routine requisition from an afloat customer who is out of the area may be filled and routed to the parcel post pack line and mailed. Other lines can receive material-laden tote pans for local delivery, special packing or other customer requirements.

National City Annex efforts are devoted to bulk item movement ranging from dry provisions to boats.

Delivery centers are operated at both National City and Broadway to get material to local customers. To ensure maximum utilization of resources, a central transportation dispatcher utilizes a specialized computer-generated tool to direct deliveries. The tool is the Vehicle Scheduling Program (VSP), which determines the optimal use of available transportation assets for required deliveries every day.

Shipping operations accommodate transhipments, as well as meeting overseas customer demands filled at the Center. Shipments in FY 1972 totaled 250,000 measurement tons.

A block diagram of this system is shown in Appendix A.

B. THE SIMULATION MODEL

The computer program was written in the General Purpose Simulation System/360 language. The simulation utilizes the real system's input parameters, and, therefore, requires a

relatively large magnitude of bytes (about 260K) of basic core allocation. This is primarily necessary to allow for the large input of transactions and for the GPSS parameter assignments that were programmed with these transactions. Although the program can be considered fairly efficient in GPSS terms, the computer central processing unit (CPU) running time is about 4 minutes for each month of real time simulated in time steps of 0.01 hours. The length of time required to reach steady state and the resulting conditions are discussed in Chapter IV.

For the convenience of NSC San Diego, the simulation program has an input section at the beginning to facilitate testing various system parameters. The inputs consist of the following:

1. Average Total Monthly Requests for Standard Stock (MRSS). A low limit of 63,000 is imposed in the model due to the large variance on the distribution of a typical daily input. This prevents a negative demand from ever occurring in the model.
2. Requisition processing times for each work station shown in Appendix A. These times are entered as thousandths of an hour per transaction, and, with one exception, these data were obtained from the appropriate Defense Integrated Management Engineering Systems (DIMES) methods engineering maintenance studies for each work station. The single exception was the time to edit a transaction in customer services which was

not included in the DIMES standards. Therefore this time was obtained by observing current procedures and daily backlogs in editing.

3. The number of personnel assigned to each work station. Since the basic model is essentially a one shift operation, the night shift worker in customer services was added to the day shift resources in customer services editing.
4. The quantity of autodin input (AUTOI).
5. Gross Material Availability (GROSS).
6. The quantity of prepunched DD-1348 input (PREP).
7. The quantity of demand exceptions (DEEX).
8. Local delivery capability (DRIVE) as the number of truck drivers available to deliver the staged material to the 9 delivery zones. This represents a line item delivery capability of 4300 line items per workday and is based upon current local transportation operating procedures.
9. Assignment of transactions to lots is accomplished by GPSS function GENF2. The lot number indicates the GPSS picking priority in the warehouse and is consistent with actual picking priorities. The percentage of total monthly input assigned to each lot number is in agreement with the issue priority group percentages computed from Reference 5. The "other" category shown with this input variable consists of the percentage of cold storage requests in the total input.

10. The distribution of local customer material among the 10 delivery zones. This is accomplished by function STAF1 and is based on an NSC San Diego transportation study of December 1971.

Additional information on these inputs is included in Appendix B.

The master clock section controls the processing of transactions by ensuring that work starts each weekday morning at 0730 hours and stops for lunch hours, for overnights at the end of the daily shift, and for weekends. A work stopage of two days is programmed every other week at the data processing punch facility. This is necessary due to the accumulation of punching backlogs from sources (e.g., payroll, financial, and other biweekly reports) other than customer issue group three requests.

Generation of customer requisitions is accomplished daily for an assumed 21 workdays each month. The distribution of each separate weekday's input is assumed uniform over the normal workday. The variance of input for each day of the week, Monday through Friday, was computed from Reference 5. The transactions are assigned a picking code, a packing code, and a lot number upon being generated to facilitate programming but without detracting from the validity of the simulation. Normally these assignments are made later by the computer during the lotting period each night. The transactions are then separated into point of entry and autodin requests. The processing of point of entry requests begins

in customer services editing, while autodin requests go to editing if they are issue priority group one (IPG1) or to data processing (CPU) if IPG2 or IPG3.

A messenger system is created in the simulation to provide for intra-departmental transportation of requisitions in accordance with standard operating procedures at NSC San Diego. Presently a messenger run occurs at two hour intervals during normal working hours. The printed picking tickets are also simulated being delivered to both the National City and Broadway picking areas at 0730 each workday morning.

Customer services editing is the first processing station for all input except autodin IPG2 and IPG3 transactions. The backlog accumulates in the editing queue from which requisitions are processed in order of issue priority group. After editing, the requisitions for cold storage items are terminated since they are the only standard stock items not simulated further in the model. The IPG1 and walkthrough requests are keypunched here if not already prepunched by the customer, and then they are directly input to the computer CPU by one of the two remote terminals in customer services.

The walkthrough requests for material in stock are sent directly to picking at either National City or Broadway as appropriate. The available IPG1 material requests are delayed in going over to the picking area in order to simulate their being carried by messenger. IPG1 requests are modeled as if they were processed over three 8 hour shifts daily vice

one shift. This is consistent with existing procedures for the handling of high priority requisitions.

Any IPG2 requests not prepunched are keypunched and verified in customer services before the messenger takes them to data processing for holding until they are input to the CPU with the IPG3 requests. All IPG3 requests not prepunched are delivered by messenger from editing to data processing for keypunching.

In the Central Processing Unit only that percentage determined by the gross availability is lotted at midnight by the computer. A separate program at San Diego designates those ships that are to receive special processing as HOTSHIPS once the picking tickets have been printed. These ships are so designated by the Fleet Commander as a result of current operational commitments. The HOTSHIPS are lotted separately and are processed before the IPG2 and IPG3 lots.

NSC San Diego has a separate lotting program that sorts the material requests according to the number of line items per customer within each priority group. The maximum size of a lot is dictated by the number of customers, starting with the largest customer, that can be in a lot before the packing line capacity is reached. A second lot and possibly a third lot may be required to accommodate all the IPG3 requests for a day. The actual lotting procedure has not been simulated in the model. Instead, the IPG3 requests have been allotted to three lots daily. This procedure is assumed accurate in the simulation since the picked material

is still waiting in lots to be sent over to packing via the automated materials handling system conveyer as soon as the packing lines are ready to receive the material. Thus, three IPG3 lots each day instead of only one, two, or three lots would tend to reduce overall average throughput time since there would be less large lots to finish in picking and packing before starting a new IPG2 lot waiting to be picked.

At 0730 on the next workday the computer printed picking tickets are taken to the appropriate floor at the Broadway Compound or transported to National City. The availability percentage is assumed to be constant over each issue priority group. A percentage of the input to the central processing unit is routed back each morning to customer services for reprocessing as simulated demand exceptions and warehouse refusals.

When picking tickets reach the storage areas, the items are again placed in a queue from which they are picked according to the lot number assigned to that transaction. The IPG1's are picked before the walkthroughs, and both are disruptive by nature in that they are both picked prior to any lotted IPG2 or IPG3 transactions. Lotted IPG2's are picked prior to lotted IPG3's, regardless of the lotting date. To make the model consistent with actual practice, the programming allows for a partially completed lot in picking at the end of one workday to be completed at the beginning of the next workday before starting a new lot. All walkthroughs are terminated from the model once they are picked for the waiting customer.

After being packed and marked, the items that have been packed parcel post and all IPG1's are terminated. This assumes all IPG1's go to shipping for further transfer to the customer by either air freight or commercial truck or Quicktrans. This is the actual handling for IPG1's unless the customer is in port, in which case the material is trucked locally to him. The remaining items, non-parcel post IPG2 and IPG3, are all assumed to go to staging areas for local delivery by truck. This assumption is necessary due to insufficient information concerning shipped material.

The simulation model assigns a delivery zone to each transaction as it goes from marking to the staging area. The material is distributed among the 9 zones in accordance with the size and number of customers for each delivery zone. This is also the basis for the zone priority delivery schedule which resulted from a local transportation study conducted by NSC San Diego. This delivery system is followed in the model with one exception--the priorities of zones 3 and 9 on Tuesday and Friday were reversed. This was necessary in order to eliminate a buildup of material in zone 3 which in reality would never occur because it would be delivered as soon as observed by local managers. In effect, twelve drivers make two deliveries to each of 5 zones on each work-day. The zones receiving deliveries depend upon the day of the week, but deliveries are made to each zone at least two days each week.

C. OUTPUT FROM THE MODEL

Several types of output measures are obtainable, and they should be viewed in total in order to grasp the effects of varying a parameter of the model. The frequency distributions of queue delay time at each of the working stations together with the more important statistics are shown in the computer output. The production rate at each work station is defined as the number of transactions output per man-hour of effort available. The utilization rate is defined as the percent of time non-consumable resources are actually doing productive work. Prichard [Reference 2] warns against placing too much importance on production rate alone. The easiest way to maximize production rate is to increase the utilization rate which can be increased by maintaining a larger backlog of requests at a given work station. However, if the utilization rate approaches 100%, then the queue delay time is higher and so is the throughput time. Utilization rate in practice can never reach 100% due to such unavoidable delays as official talking with a supervisor, fatigue, and training. Based on local purchasing data at NSC Newport, Ref. 2 emphasized that the sum of the active processing times accounted for only 1% of their purchasing cycle total throughput time.

The computer program provides for computing the average utilization of each work station by taking a random sample over the normal eight hour workday. The standard GPSS output

of utilization was inadequate for our model because it considered all non-productive offtime as time available for productive work, and it considered a facility utilized during such non-productive time if a partially processed item was held there at the end of normal working hours.

Before discussing throughput time further, it is necessary to make clear its definition. Throughput time is the elapsed time required to complete the processing of a single transaction. It is composed of the following four elements described in Ref. 2:

1. Active processing time - the time during which someone (or some machine) is reading, writing, transcribing, keypunching, proofing, etc., a document or picking, packing, unpacking, lifting, stowing, etc., material. Again using DIMES terminology, it is the sum of the engineered time standards for all elements in the process.
2. Off-time - the time material and documents are waiting because employees are not normally available to process them. This period encompasses evenings, weekends, and holidays.
3. Active (or programmed) waiting time - this is the period during working hours when the document or material is intentionally unprocessed. Active waiting time encompasses batching at the end of an operation, movement to a new station, and queuing in front of the new station.

4. Passive (or unprogrammed) waiting time. This is the portion of total throughput time that cannot be accounted for by active processing time, active waiting time or off-time.

It is to be noted that the model developed simulates only the first three elements of throughput time. Passive waiting time can also be viewed as the factor that prevents a utilization from reaching 100% in a real work environment. Thus, the measured average throughput time per transaction will always be optimistic.

Also, in this model, an increase in availability of material at San Diego will not result in a decrease in throughput time unless resources are increased concurrently. This is due to simulating the complete processing of only those demands for which material is in stock rather than all the demands input which are eventually filled through other methods and/or other echelons of supply.

"Throughput time" or issue processing time has been used by this study as the measure of the worth of the supply system at the Naval Supply Center, San Diego.

Throughput time is defined in this study as the time elapsed from initial receipt of the material request by the Center to the material release time. Material is considered released when (1) the material is physically turned over to the freight terminal department, or (2) the material is physically turned over to the Postal Service, or (3) the

material is loaded on vehicles for local delivery/pickup. For purposes of this study, material physically positioned in a transit shed awaiting local delivery was not considered released as this material is still under the direct control and influence of the Supply Center Commander - see OPNAVINST 4614.1D, 22 June 1971, [Reference 8].

The simulation output provides a Supply Distribution and Inventory Control Report (4000) NAVSUP FORM 1144 (Monthly) with the significant entries filled in to illustrate what actually occurred in the simulation. This includes an issue processing analysis of the percentage shipped on time by priority group for comparison with the Uniform Material Movement and Issue Priority System (UMMIPS) time standards.

Also provided is an analysis section on throughput time. Under a given set of input conditions, this section provides:

1. Average throughput time in days for all issue priority groups combined and issue priority groups two and three separately.
2. The time in days to issue 95% of all requests combined and separately for issue priority group two and three. This assumes that the average throughput time for approximately 75,000 issues per month is normally distributed.
3. The average number of requisitions in process at an arbitrary point in time.

These are meaningful measures of effectiveness to observe when the objective function is to minimize throughput time subject to available resources.

III. VERIFICATION OF THE MODEL

Although the results obtained from the simulation of operations appear reasonable to the authors and are consistent with past knowledge, a rigorous verification of the results has not been accomplished. Procedures for validating the simulation model have been determined and are included in this chapter. It is expected that validation tests will be performed at a later date by personnel at the Naval Supply Center, San Diego.

As a minimum, it is recommended that the verification test period extend for one month. It is advisable to have the test coincide with the normal reporting period of the NAVSUP FORM 1144 and the DIMES monthly reports. These two reports are the primary data sources for input parameters to the simulation model. Appendix C lists the data requirements for inputs to the model during verification.

A minimal verification can be conducted by verifying the model's frequency distribution of total throughput time (i.e., table "TIME" in the model's standard statistical output). A more complete verification would include the verification of the distribution of delay time for each work center (see Appendix D for a listing of work centers).

The following verification procedure is suggested:

(1) Start the verification on the first working day of the month.

(2) Draw a random sample on each workday of approximately 35 requisitions for a period of one month. This sample should be drawn at random for all sources of input (i.e., hand-delivered, AUTODIN, mail, message, etc.). *1

(3) Record the date and time that each sample requisition is received by the supply center.

(4) Record the date and time that each sample requisition leaves the supply center (i.e., delivered to a local customer, released to the U. S. Postal Service, or released to transportation for a non-local delivery). For a more complete verification, record the date and time each sample is released to the next work center.

(5) Collect all data suggested in Appendix C. These will be used as input parameters to the simulation model.

(6) Input the data from (5) into the model. Reset the model after a simulated run of one month. Restart the model and run for a minimum of six repetitions of one simulated month.

(7) Tabulate sample throughput data into 15 classes (i.e., < 1.0 days, < 2.0 days, ... < 14.0 days, ≥ 14.0 days). Construct a frequency distribution of these data.

(8) Using the Chi-Square Test for Goodness of Fit, test the null hypothesis that the simulation model's distribution function of total throughput time is

the same as the sample distribution constructed in (7). A probability of a type I error of 0.1 would be a reasonable criteria for accepting or rejecting the null hypothesis.

(9) If the null hypothesis of (8) is accepted, the model is considered verified. If the null hypothesis is rejected, the model is considered invalid.

*1 A sample of 35 requisitions per day will yield 700-800 requisitions in the total sample. This sample size was selected to provide a 0.95 probability that the sample cumulative distribution would be within $\pm$ 0.05 units of the population cumulative distribution. See Table A-21b of Dixon and Massey, Introduction to Statistical Analysis, 3rd edition.

IV. ANALYSIS

A. THE BASIC MODEL

The results for this simulation model were considered to be stationary in time after a period of two months. The average number of requisitions in process at NSC San Diego at any time is the most important criteria for measuring this stability or steady state of the system. After the simulation had run two months, the hypothesis that the average pipeline (requisitions in process) was the same as the average value of the third through sixth months of the simulation was acceptable. Acceptance was based on a t-test with a critical level of .05. A time period of six months was used to ensure steady state conditions not only in the basic model discussed herein but also for each of the variations of the basic model that were analyzed. Total throughput time was also relatively stable throughout the six months. The mean total throughput time was obtained for each of months one through seven. The coefficient of variation of these mean values over the latter six months was found to be less than 3%.

Each computer run consisted of simulating for one month, resetting the model and simulating for a total of six months. The model would otherwise have been "empty" of demands when it was first started, and the reset allows the simulation to continue with a pipeline of demands in process at the Supply Center.

The steady state results for the basic model are presented in the computer output section. The throughput time for each issue priority group was compared with current UMMIPS standards. The standards used are two days for IPG1, three days for IPG2, and 11 days for IPG3. These are the standards of Ref. 8 for issuing point of entry requests and were used in the model for issuing the autodin requests also. The results of the comparison are shown in the issue processing analysis of the NAVSUP FORM 1144 in the computer output. The IPG1 and IPG3 material are more than meeting the time standards as 100% and 99% respectively are being shipped on time. The problem area is with the IPG2 material in that only 63% is shown as shipped on time.

Additional information to assist in this analysis is given in the summary data on NSC San Diego work centers. This breakdown of the total system throughput time reveals that the two largest delays are at the Central Processing Unit - where both issue priority groups 2 and 3 are lotted together daily - and at the transportation staging area. The CPU delay time is not only a measure of the active processing time but also the time the requisition waits in data processing before lotting and the time after lotting until the requisition is delivered to picking the next morning. Weekends are also charged against the CPU delay time to account for the delay of Friday night's picking tickets waiting until Monday morning before going to the picking area. This average CPU delay time is accurate for the

lotted material (IPG2 and IPG3). It does not include either the processed IPG1 and walkthrough requisitions or the requisitions input to the CPU for material not available.

The distribution of total throughput time was verified to be a normal distribution by a Chi Square Goodness of Fit Test. The analysis of throughput time section then shows the 95 normal percentile of all issue priority group 3 transactions as issued within 6.09 days - well within the time standard of 11 days and approximately only one-half day longer than for the 95 percentile of issue priority group 2 transactions which have a standard of 3 days.

The greatest single contributor to "throughput time" is the planned delay in the transportation staging area (i.e., material awaiting local transportation). Approximately 45% of the total "throughput time" for material in IPG2 and IPG3 was expended in this staging delay.

Once material reaches the staging area, it is delivered on a first-in, first-out basis, with no priority given to IPG2 over IPG3. Some material waits there up to 5 days. Thus, the inability to differentiate between IPG2 and IPG3 material in staging contributes to the close correlation of the time to issue the 95 percentile for these two issue groups. This is to the advantage of the IPG3 material but certainly is detrimental to the IPG2 material meeting its time standards.

The tables in the GPSS standard statistical printout present a comprehensive source of analytical information and are the basis for the graphs shown in the output. To

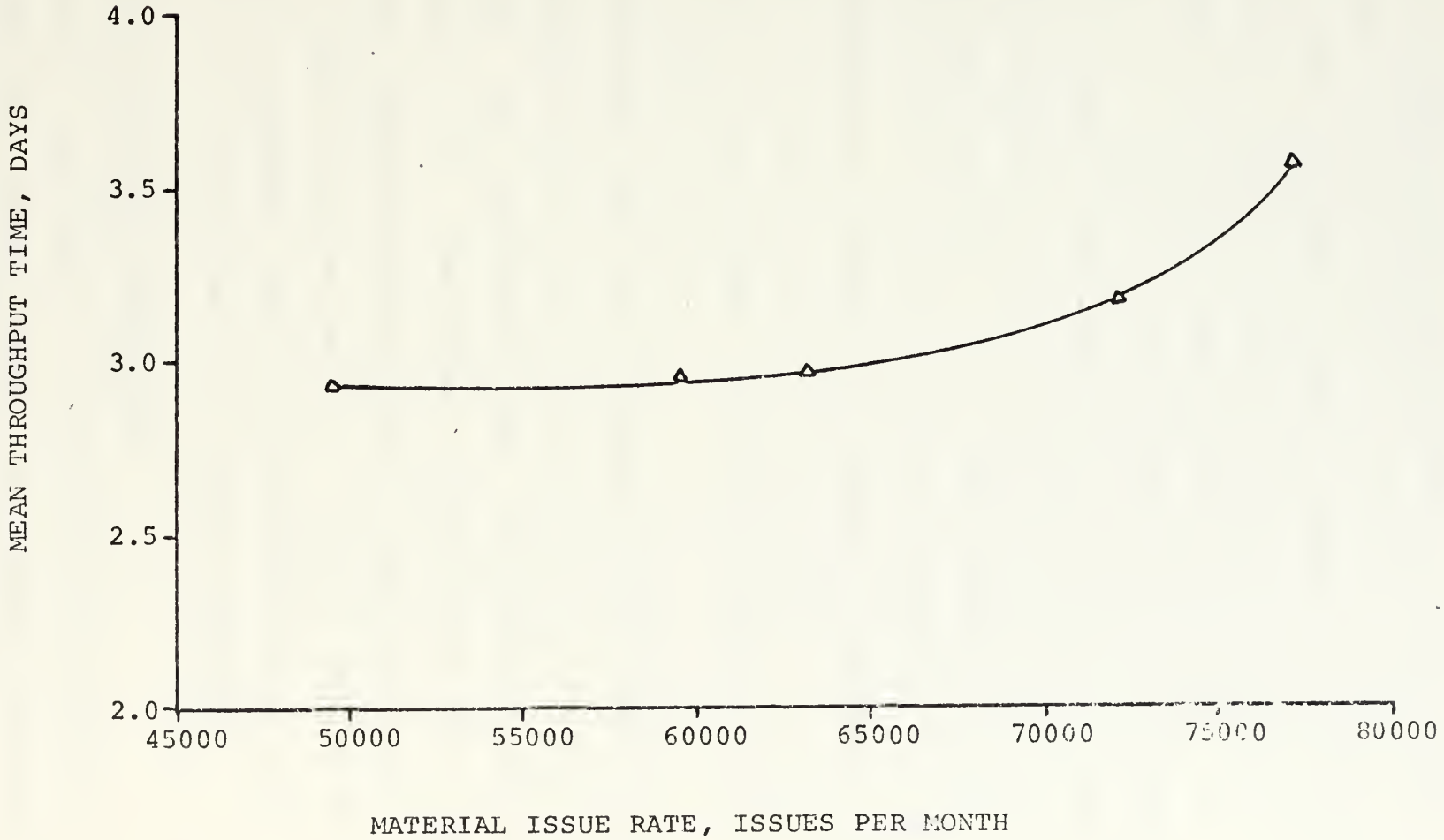
facilitate use of the tables, their definitions are given in Appendix E.

B. INCREASING/DECREASING THE DEMAND INPUT

The input parameter, the monthly material requests for standard stock items (MRSS), was varied to consider the affect this parameter has on total throughput time. Increases and decreases of 10%, 20%, and 30% of the standard model's input of MRSS=113,500 were investigated. The variation of the average time to process a supply request (i.e., from receipt to issue) with the material issues per month is depicted in Figure 1. In general, the change in MRSS input had very little effect on the NAVSUP FORM 1144 Issue Processing Analysis section reflecting the percentages issued on time. In the case of the lowest input, MRSS-30%, the percentage of IPG2s shipped on time increased by less than 2% over the base case.

The only case where prescriptive action was taken concurrently with a change in input was the MRSS+30% case. In view of the recognizable local transportation problem, a nominal 25% increase in truck drivers was made in order to avoid an excessive build-up of requisitions still in process - awaiting transportation but still in the pipeline at the Center - in the simulation. The optimal vehicle scheduling policy used currently by NSC San Diego can adequately handle an increase of 10% or 20% in demand workload. For these two increases, the percentages of material shipped on time remained the same. The time to issue the 95 percentile of material available and the staging area transportation delay time

Figure 1. Mean Throughput Time vs. Material Issue Rate (All Issue Groups).



increased as expected with the increases in demand input. The increases in the 95 percentile of issues with the material issues per month is shown in Figure 2. However, an increase of 30% results in 94,000 issues each month which would surpass the current local delivery capability. In addition, a 33% increase in the demand exception workforce and an 8% increase in the number of packers at the Broadway Compound were made in view of the already high utilization rates at these facilities. Thus, these manpower increases enabled the MRSS+30% case to maintain essentially the same percentage levels of transactions shipped on time as in the base case. The increase in size of the number of requisitions in process - in the pipeline - with the increase in monthly issues is shown in Figure 3.

As the demand input was increased, the utilization rates and throughput time at each work station increased significantly also. For the MRSS+20% case, the average increase in utilization was 16%. The highest increases were 20% at both the Broadway Compound packing facility and at the customer services demand exception facility. Figure 4 depicts the increase in throughput time at the Broadway packing work station as the utilization of the packers increases.

C. VARYING THE INPUT DISTRIBUTION

To consider the affect of varying the distribution of daily input for a typical workday, the uniform distribution used in the base case was modified. In its place an empirical

Figure 2. 95th Percentile of Throughput Time vs. Material Issue Rate (All Issue Groups).

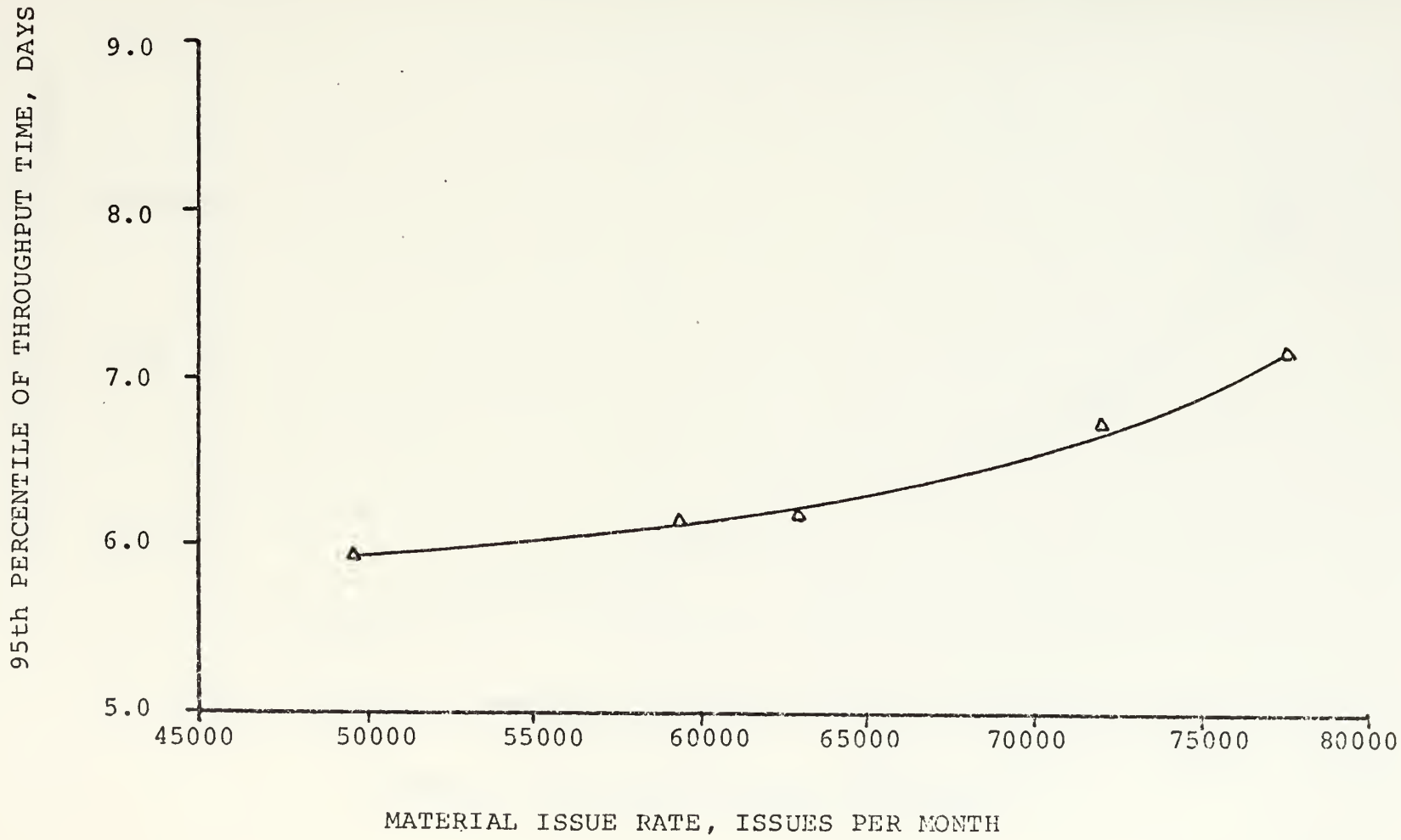


Figure 3. Material Requests in Process vs. Material Issue Rate

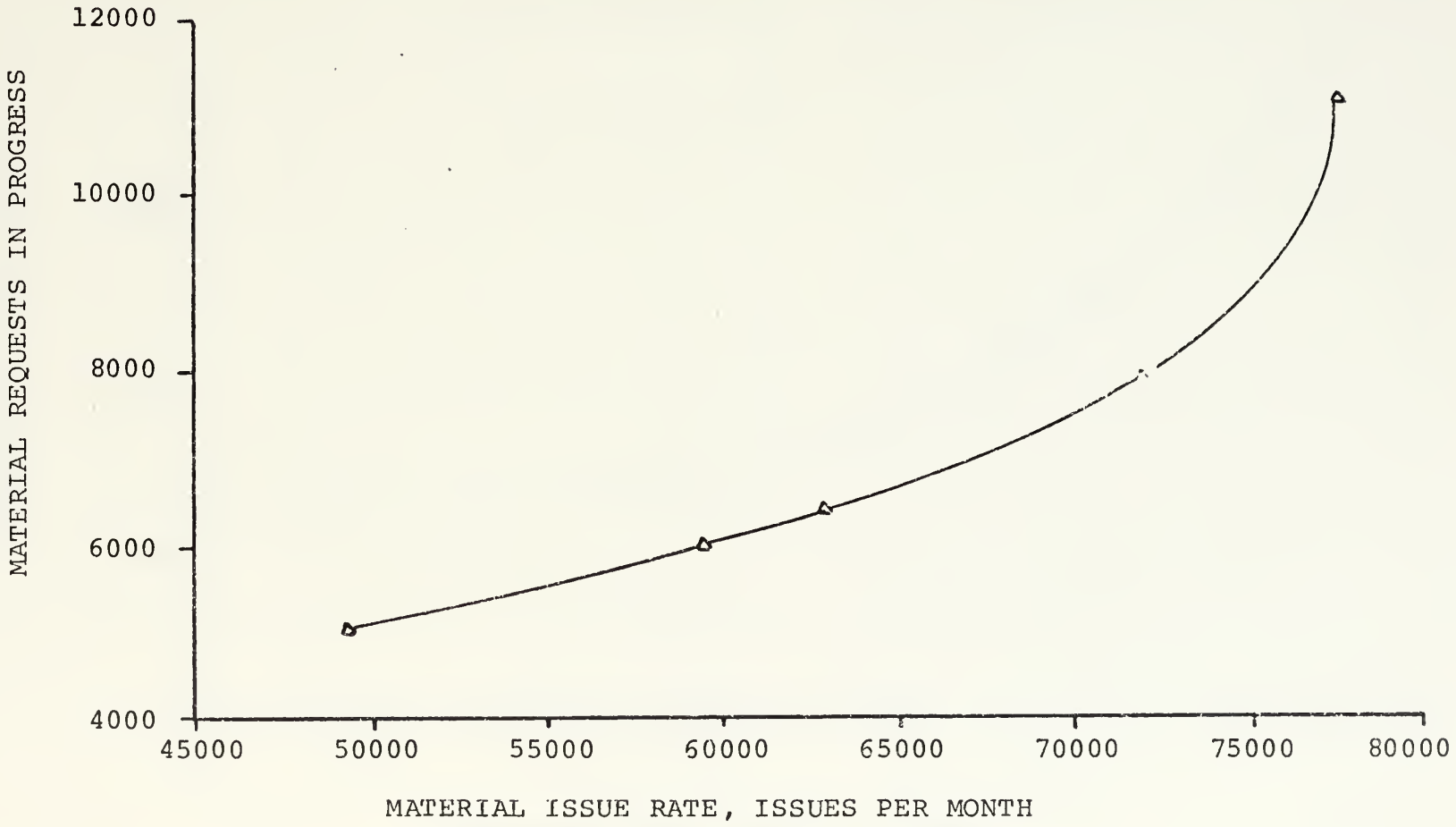
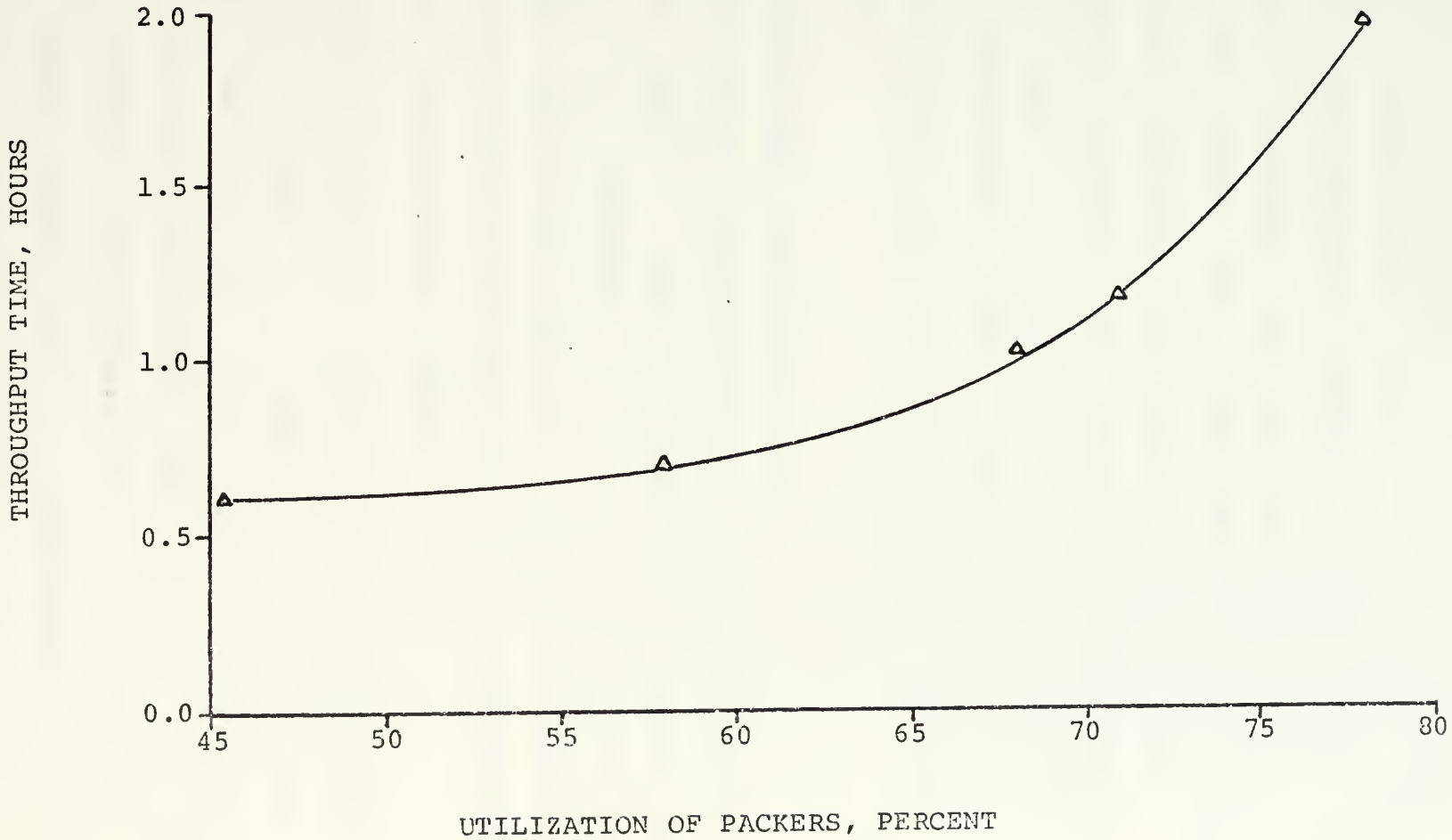


Figure 4. Utilization of Packers vs. Throughput Time.



distribution of demands at NSC Newport [Ref. 1] was used. This distribution was used for all issue priority groups. Total average throughput time per transaction increased about four hours above the base case. The difference observed was due to the high morning rate of input with the Newport distribution which built up a large backlog in the customer service editing facility. This increased the delay time in the customer services division by almost four hours. The utilization percentage in editing remained the same in this case compared to the base case due to the lower afternoon demand rate.

D. LIFO VERSUS FIFO IN THE STAGING AREA

The base case was compared with First-in - First-out (FIFO) versus Last-in - First-out (LIFO) delivery service from the staging area. The average delay time in the staging area was the same, and thus is independent of the order of delivery service. There was no significant change in the percentage of IPG2 and IPG3 transactions shipped on time.

E. AN INCREASE IN THE LOCAL TRANSPORTATION DELIVERY CAPABILITY

This run considered a variation in the local delivery schedule from the existing priority delivery schedule whereby daily deliveries for each delivery zone were made. The average total throughput time decreased to 2.65 days compared with 2.80 days for the base case. An improvement of 5% in the number of issue priority group two transactions shipped on time was observed--from 63% to 68%. The average delay in

the transportation staging area was reduced 13% compared to the base case.

F. TWO SHIFT OPERATION WITH DAILY LOCAL DELIVERIES

A two shift operation with daily local deliveries resulted in a slight change in the average throughput time (2.49 days) compared to the previously discussed case of one shift operations with daily deliveries (2.65). The percentage of issue group two transactions shipped on time increased by only one percentage to 69%. The total personnel resources at each work station were held at the same level as in the base case.

G. SIX DAY WORK WEEK

A six day work week was considered while maintaining the same personnel resources as in the basic model with no overtime. Local transportation provided daily deliveries to each zone. This provides a solution to the problem of issuing the 95 percentile of all IPG2 transactions on time as 98% were shipped within the UMMIPS standards. The average throughput time per transaction was 1.45 days. The average delay in the transportation staging area was only 10.18 hours. The sixth day, Saturday, was used to process and ship IPG2 material. The work week was split so that personnel working Saturday had a weekday off. The model did not consider possible additional supervisory personnel required for a six-day week, nor did it consider that customers may not be available to accept materials on Saturdays. The sixth day

of processing transactions allowed both the material normally held over the weekend in the packing queue Friday afternoon and the IPG2 material lotted Friday night to be processed for issue by Saturday afternoon. This enables the backlog in the system to be comparatively small by each Monday morning when the heavy demand input begins again. The average number of supply requests in process within the system decreased from 7055 for the base case to 1633.

One of the most significant reasons for the delay in IPG2 material is the waiting that occurs over the weekend. Requests for IPG2 material which arrive on a Friday will not be "picked" until the following Monday and conceivably not delivered until later in the week. Consideration was given to providing priority transportation to locally delivered IPG2 material. However, due to the weekend delays, the authors feel that no significant improvement would occur in IPG2 throughput time.

V. SUMMARY

"Throughput time" or issue processing time has been used by this study as the measure of the worth of the Supply System at the Naval Supply Center, San Diego.

Standards for "throughput time" were provided by OPNAV Instruction 4614.1D, Uniform Material Movement and Issue Priority System (UMMIPS), 22 June 1971. As applied to this study, issue of 95% of supplies within UMMIPS time standards was considered satisfactory.

An analysis of the model indicated that, under simulated operating conditions and management policies, material in IPG1 and IPG3 are being "shipped on time." However, only 63% of the material in IPG2 is being processed in less than the 3.0 calendar days required by UMMIPS.

The greatest single contributor to "throughput time" was the active (programmed) waiting time in the transportation staging area (i.e., material awaiting local transportation). Approximately 45% of the total "throughput time" for material in IPG2 and IPG3 was expended in this staging delay.

Once material reaches the staging area, it is delivered on a first-in, first-out basis, with no priority given to IPG2 over IPG3. While this is a satisfactory arrangement for IPG3 material, IPG2 material may be delayed in staging for three to five days.

The model was exercised to determine if an improvement could be made in the issue processing time of material in IPG2.

Constraining the model with existing resources (i.e., no increase in personnel or paid overtime), the simulation indicated that 98% of material in IPG2 could be issued in 3.0 days or less by (1) daily deliveries to all local delivery zones vice the current policy of two deliveries per week to a zone, and (2) process and ship IPG2 material on Saturdays.

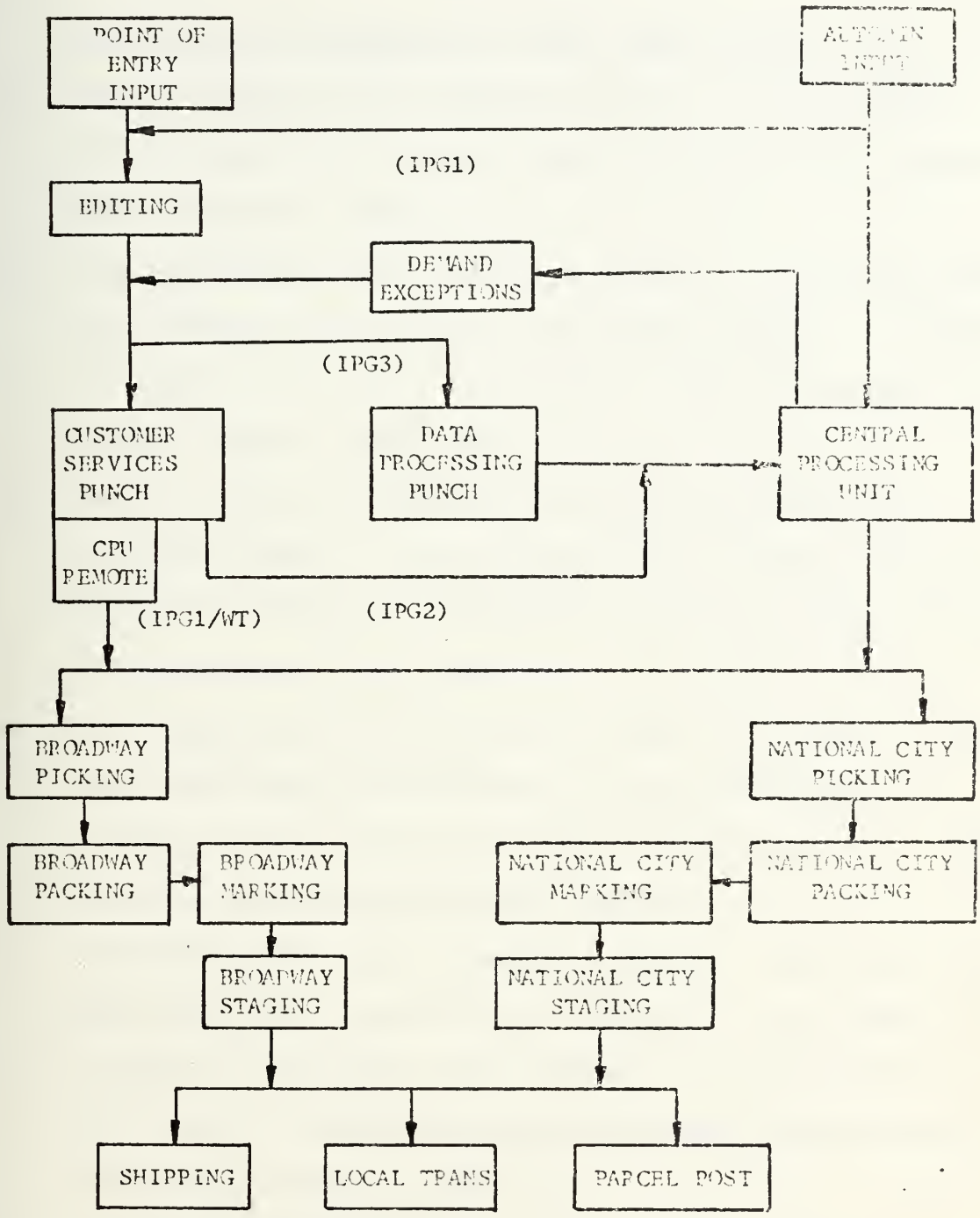
The model was further exercised to determine the effects of an increased workload at the Supply Center (i.e., an increased number of material requests). Bottlenecks begin to first occur in the Broadway packing operation and the customer service demand exception unit. As the material requests further increased, the total "throughput time" was extremely sensitive to the number of drivers available to make local deliveries (i.e., "old" material began to back up in staging).

Utilization rate was another output of this model. Utilization rate is defined as the percentage of time non-consumable resources (i.e., direct labor) are actually doing productive work. The model revealed that a high utilization rate is not necessarily desirable. For example, a 10% increase in the utilization rate in the Broadway packing operation caused the throughput time to double. In general, increasing utilization will result in a higher throughput time.

Finally, it is important to note that material is being processed efficiently and effectively from the receipt of the material request through the system to the packing operation. A modern, efficient system has been designed to perform

this function. However, when the material leaves packing, the system appears to break down. Much of the time gained through the Automated Material Handling System is lost in the transportation staging area. As one transportation supervisor aptly noted, "It's like a five-million dollar dog with a two-bit tail."

APPENDIX A. Block Diagram of Flow for Processing Transactions for Material Available at Naval Supply Center, San Diego



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APPENDIX B

Definition of Parameters to the Basic Model

1. Monthly Requests for Standard Stock (variable MRSS). The average total monthly input of requests for standard stock material. Ref. 3.
2. Edit processing time (variable EDITP). The time to edit one incoming requisition in customer services. Computed from Ref. 3 as line 3 less autodin requests divided by average monthly man hours.
3. Demand exception/warehouse refusal processing time (variable DEWRP). This is the DIMES standard for one worker to process one transaction that has been returned to customer services. Ref. 4.
4. Punch processing time (variable PUNP). The time to keypunch and verify one document on the IBM 029/026/870 in customer services or to keypunch and verify one 1348 document in data processing. Ref. 4.
5. Pick processing times (function FPIC1). These are the DIMES work unit standards for picking an individual item of material depending upon whether it is classified as bin, bulk, or hotline bin/bulk at either National City or Broadway Compound. Ref. 4.
6. Transaction designation as to type to be picked (functions 12 and 14). These functions designate the percentages of line item requests that are bin, bulk, hotline bin/bulk items based upon the percentages of

DIMES standard daily work hours for each type. Ref. 4.

7. Pack processing times (function PACF1). These are DIMES standard times for packs converted to times for individual items corresponding to whether the item would be part of a light pack, as-received (A/R) light pack, rough pack, heavy pack, A/R heavy pack, or parcel post pack at both National City and Broadway. Ref. 4.
8. Transaction designation as to the type of pack required (function 11). These percentages were determined from DIMES standards for each type of pack occurring. Ref. 4.
9. Mark processing times (function MKF1). These are DIMES standard times for marking packs converted to times for marking individual items at both National City and Broadway. Ref. 4.
10. No. of workers editing (storage EDIT). This is the number of workers engaged full time in editing incoming requisitions. This currently is one worker during the day shift and the night worker handling high priority requisitions.
11. No. of workers processing demand exceptions and warehouse refusals (storage DEWR). This currently is three workers.
12. No. of keypunches available in customer services (storage PUNCH). This is currently two machines.
13. No. of workers punching issue priority group three DD1348 requisitions in data processing (storage DAPR). This was computed using the DIMES standard daily hours

utilized in keypunching and verifying these requisitions out of the total standard daily work unit hours. Ref. 4.

14. No. of workers picking material at Broadway and National City (storages PICK and NPIC). Ref. 4.
15. No. of workers packaging material at Broadway and National City (storages PACK and NPAC). Ref. 4.
16. No. of workers marking material at Broadway and National City (storages MARK and NMAR). Ref. 4.
17. No. of drivers available for local delivery of material (variable DRIVE). Ref. 7.
18. Audodin input (variable AUTOI). This is that portion, expressed in parts per thousand, of the total average monthly requests for standard stock input that is not point of entry input. Ref. 3.
19. Gross Availability (variable GROSS). Ref. 3.
20. Prepunched customer input (variable PREP). This is that portion, expressed in parts per thousand, of customer input DD1348's that are received prepunched at customer services. Refs. 5, 6.
21. Demand exception input (variable DEEX). This is that portion, expressed in parts per thousand, of the input to the CPU in data processing that result in being returned later to customer services as a demand exception or warehouse refusal. Ref. 5.
22. A function which assigns transactions to lots (function GENF2). This function assigns a lot number to each

transaction in accordance with the total percentages for an issue priority group. Ref. 5.

23. A function which designates material in the staging area to the correct delivery zone (function STAF1). This function was calculated by converting the data on the distribution of material by pallets to the ten delivery zones. Ref. 7.

APPENDIX C

Input Parameters Required for Verification of the Model

The following parameters are required for input to the model verification test:

(1) Material requests for standard stock items, during testing period.

(2) Issues of standard stock items during testing period

(3) Number of customer requests received on pre-punched DD Form 1348m cards during testing period.

(4) Number of demand exceptions and warehouse refusals by the Demand Exception Unit during the testing period.

(5) Number of customer requests received via AUTODIN during testing period.

(6) Issues of standard stock items from the National City Annex during reporting period.

(7) Issues of standard stock items from Broadway during reporting period.

(8) Number of direct labor personnel assigned to the following work centers:

(a) Demand Exception Unit

(b) Broadway Picking

(c) National City Picking

(d) Broadway Packing

(e) National City Packing

(f) Transportation - average number of drivers utilized for local transportation during testing period.

APPENDIX D

Work Centers in the Simulation Model

Work Center	*Table
Customer Service Editing	EDIT
Demand Exception Unit	DEWR
Customer Service Key-Punch	PUNCH
Data Processing Key-Punch	DPPUN
Central Processing Unit	CPU
Broadway Picking Operation	PICK
Broadway Packing Operation	PACK
Broadway Marking Operation	MARK
National City Picking Operation	NPIC
National City Packing Operation	NPAC
National City Marking Operation	NMAR
Transportation Staging Area	STAGE

* These are the names of the delay time tables found in the model's standard statistical output. These tables provide frequency distribution of queue waiting times. Since processing time is almost negligible when compared to waiting time, these tables provide good approximations to work center throughput time.

APPENDIX E

Definition of Tables in GPSS Standard Statistical Output

Table	Definition
ARRIV	Frequency distribution of demand arrivals throughout the day
CPU	Frequency distribution of central processing unit delay time
DEWR	Frequency distribution of demand exception processing delay time
DPPUN	Frequency distribution of data processing keypunch delay time
EDIT	Frequency distribution of editing delay time
FRI	Frequency distribution of total demands on a Friday
IGP1	Frequency distribution of IGP1 requisitions throughput time
IGP2	Frequency distribution of IGP2 requisitions throughput time
IGP3	Frequency distribution of IGP3 requisitions throughput time
MARK	Frequency distribution of Broadway marking delay time
MON	Frequency distribution of total demands on a Monday
NMAR	Frequency distribution of National City marking delay time
NPAC	Frequency distribution of National City packing delay time
NPIC	Frequency distribution of National City picking delay time
PACK	Frequency distribution of Broadway packing delay time
PICK	Frequency distribution of Broadway picking delay time
PUNCH	Frequency distribution of customer services keypunch delay time

Table	Definition
SAT	Frequency distribution of total demands on a Saturday
STAGE	Frequency distribution of local transportation staging area delay time
SUN	Frequency distribution of total demands on a Sunday
TIME	Frequency distribution of total throughput time
THU	Frequency distribution of total demands on a Thursday
TUE	Frequency distribution of total demands on a Tuesday
WED	Frequency distribution of total demands on a Wednesday
WEEK	Frequency distribution of total daily demands
WTHRU	Frequency distribution of walkthrough requisitions throughput time

SUPPLY DISTRIBUTION AND INVENTORY CONTROL REPORT(4000)
NAVSUP FORM 1144 (MONTHLY)

****AVAILABILITY ACTIVITY MATERIAL****		
TOTAL MATERIAL REQUESTS.LINE ITEMS	(01)	122156
EXCLUDED FROM FURTHER COMPUTATION	(02)	6914
MATERIAL REQUESTS FOR STD STOCK ITEMS	(03)	115242
STANDARD STOCK ITEMS NOT CARRIED	(04)	
NET MATL REQUESTS FOR STD STOCK ITEMS	(05)	
STANDARD STOCK ITEMS NOT IN STOCK	(06)	
ISSUES OF STANDARD STOCK ITEMS	(07)	72706
ACTIVITY NET MATERIAL AVAILABILITY	(08)	%
POINT OF ENTRY MATL REQUESTS FOR STD STK	(09)	100072
POINT OF ENTRY ISSUES OF STD STOCK	(10)	
ACTIVITY POINT OF ENTRY AVAILABILITY	(11)	%
****ISSUES BY GROUP****		
TOTAL ISSUES-GROUP 1	(18)	3353
TOTAL ISSUES-GROUP 2	(19)	26442
TOTAL ISSUES-GROUP 3	(20)	42911
****ISSUE PROCESSING ANALYSIS****		
PERCENTAGE SHIPPED ON TIME-ISSUE GROUP 1	(22)	100%
PERCENTAGE SHIPPED ON TIME-ISSUE GROUP 2	(23)	63%
PERCENTAGE SHIPPED ON TIME-ISSUE GROUP 3	(24)	99%

ANALYSIS OF THROUGH-PUT TIME
NAVAL SUPPLY CENTER, SAN DIEGO

****ALL ISSUE GROUPS****

THE AVERAGE TIME TO PROCESS A SUPPLY REQUEST (I.E.,FROM RECEIPT TO ISSUE) WAS 2.80 DAYS

95% OF ALL SUPPLIES WERE ISSUED WITHIN 5.83 DAYS

THE AVERAGE NUMBER OF SUPPLY REQUESTS IN PROCESS(I.E.,BACK-LOG) WITHIN THE SYSTEM WAS 7055

****PRIORITY ISSUE GROUP 2****

THE AVERAGE TIME TO PROCESS AN ISSUE GROUP 2 REQUEST (I.E.,FROM RECEIPT TO ISSUE) WAS 2.86 DAYS

95% OF ALL ISSUE GROUP 2'S WERE ISSUED WITHIN 5.57 DAYS

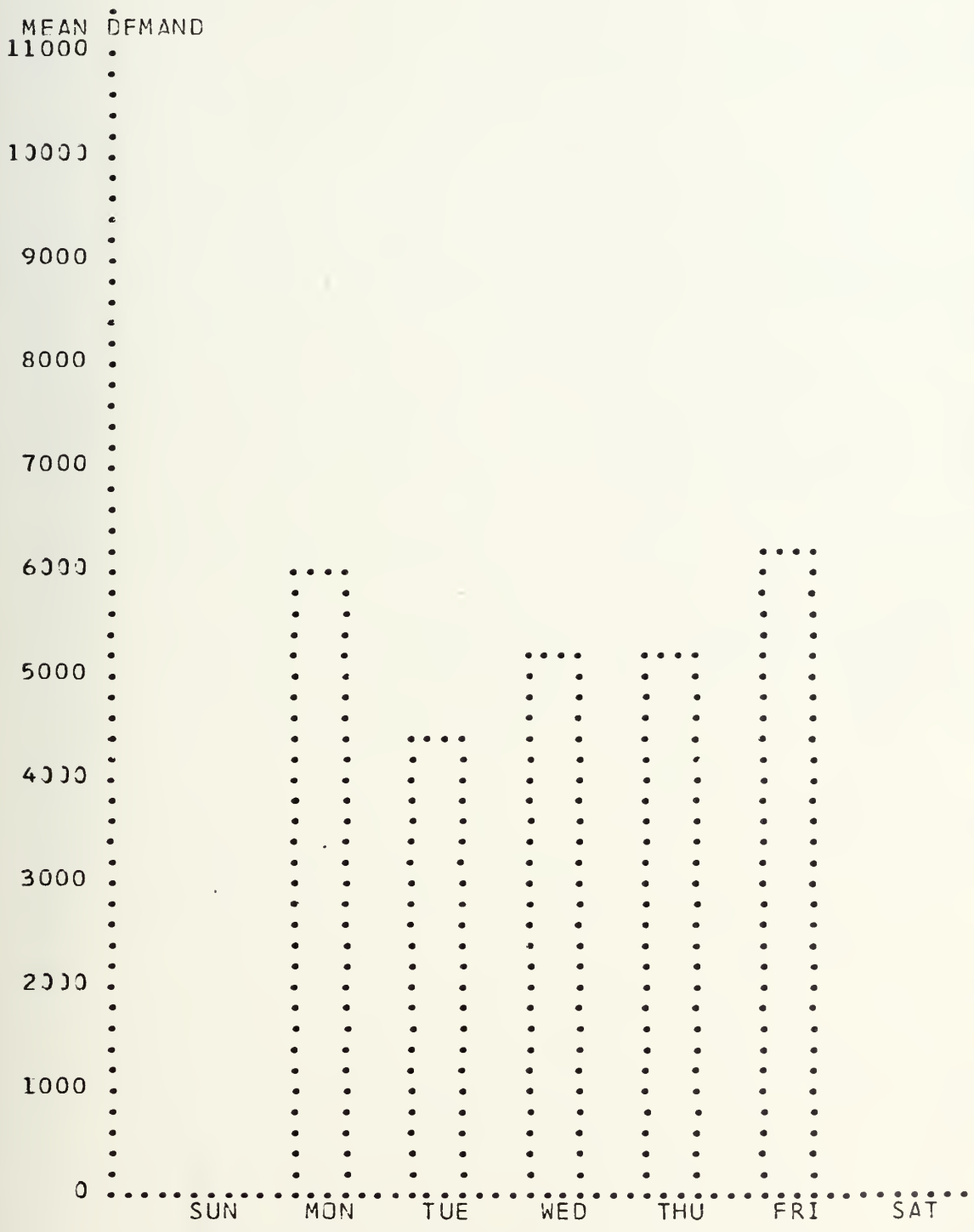
****PRIORITY ISSUE GROUP 3****

THE AVERAGE TIME TO PROCESS AN ISSUE GROUP 3 REQUEST (I.E.,FROM RECEIPT TO ISSUE) WAS 3.21 DAYS

95% OF ALL ISSUE GROUP 3'S WERE ISSUED WITHIN 6.09 DAYS

***ISSUED IS DEFINED AS (1) DELIVERED OR PICKED-UP, OR (2) RELEASED TO POSTAL SERVICE, OR (3) RELEASED TO TRANSPORTATION IF NON-LOCAL

FREQUENCY DISTRIBUTION OF MEAN DAILY DEMANDS
NAVAL SUPPLY CENTER, SAN DIEGO



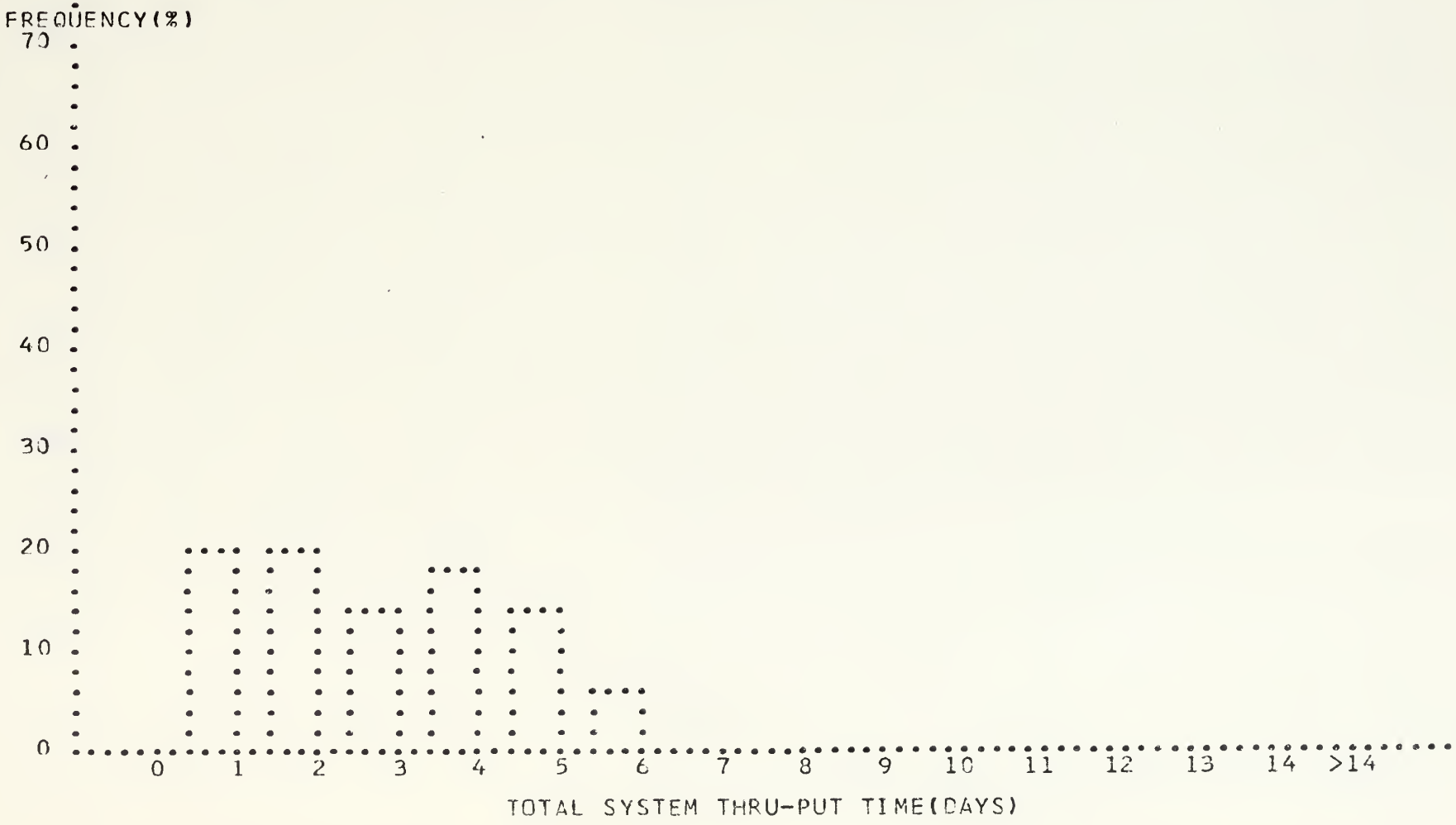
ASSUMED DISTRIBUTION OF DAILY DEMAND ARRIVALS
NAVAL SUPPLY CENTER, SAN DIEGO

SUMMARY DATA ON NSC-SD WORK CENTERS
AVERAGE UTILIZATION OF CAPACITY
AND
AVERAGE REQUISITION THROUGH-PUT TIME

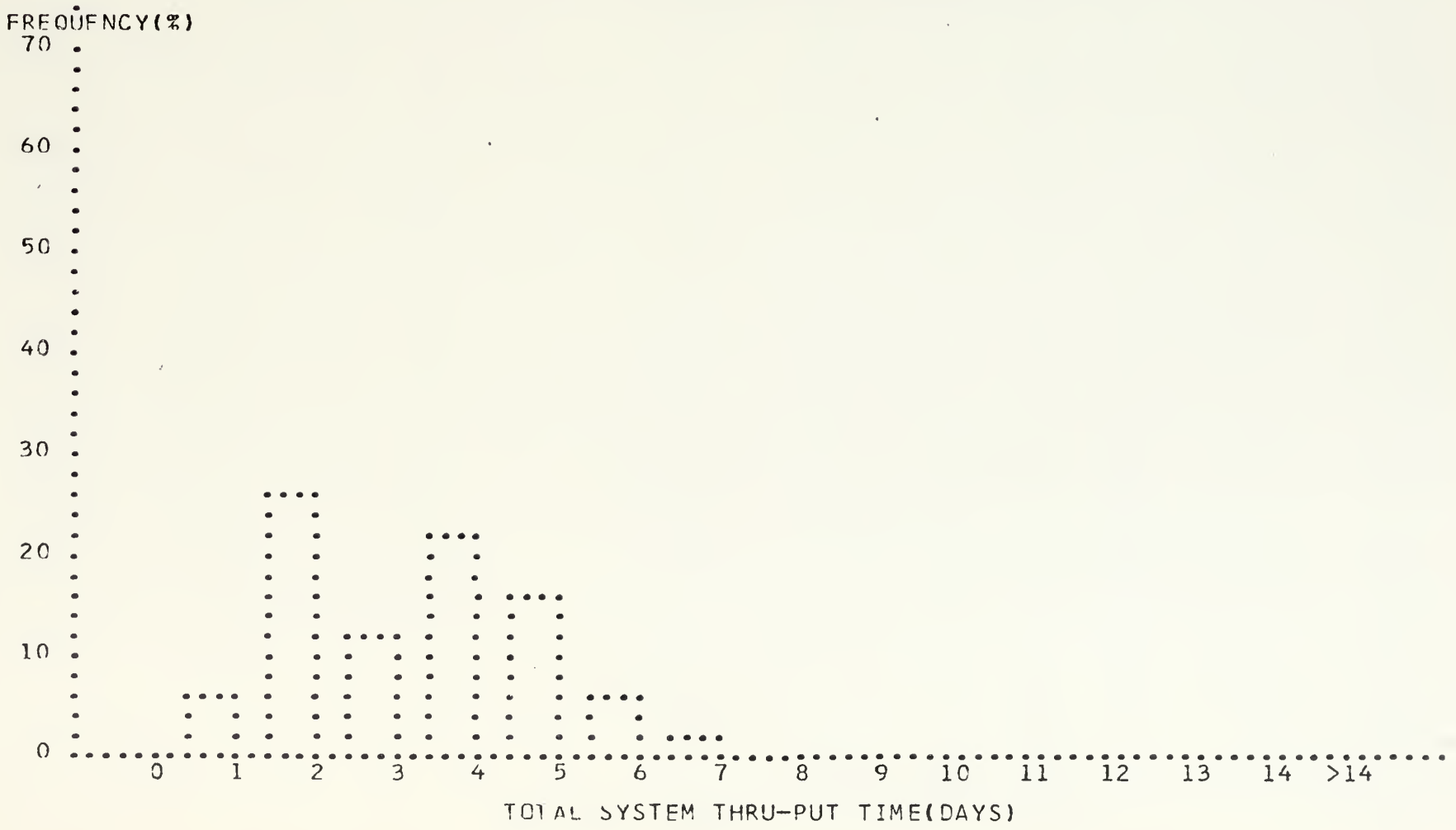
WORK CENTER	UTILIZATION	THRU-PUT TIME(HRS)
CUSTOMER SERVICE EDITING	55%	.21
DEMAND EXCEPTION UNIT	66%	3.37
CUSTOMER SERVICE KEY-PUNCH	52%	.08
DATA PROCESSING KEY-PUNCH	55%	8.07
CENTRAL PROCESSING UNIT		29.57
BROADWAY PICKING OPERATION	51%	1.72
BROADWAY PACKING OPERATION	65%	.98
BROADWAY MARKING OPERATION	53%	.30
NATIONAL CITY PICKING OPERATION	49%	1.40
NATIONAL CITY PACKING OPERATION	35%	.24
NATIONAL CITY MARKING OPERATION	57%	.67
TRANSPORTATION STAGING AREA		47.32
TOTAL SYSTEM THRU-PUT TIME OF ISSUES		67.40

FREQUENCY DISTRIBUTION OF REQUISITION TOTAL THRU-PUT TIME
****ALL ISSUE GROUPS****

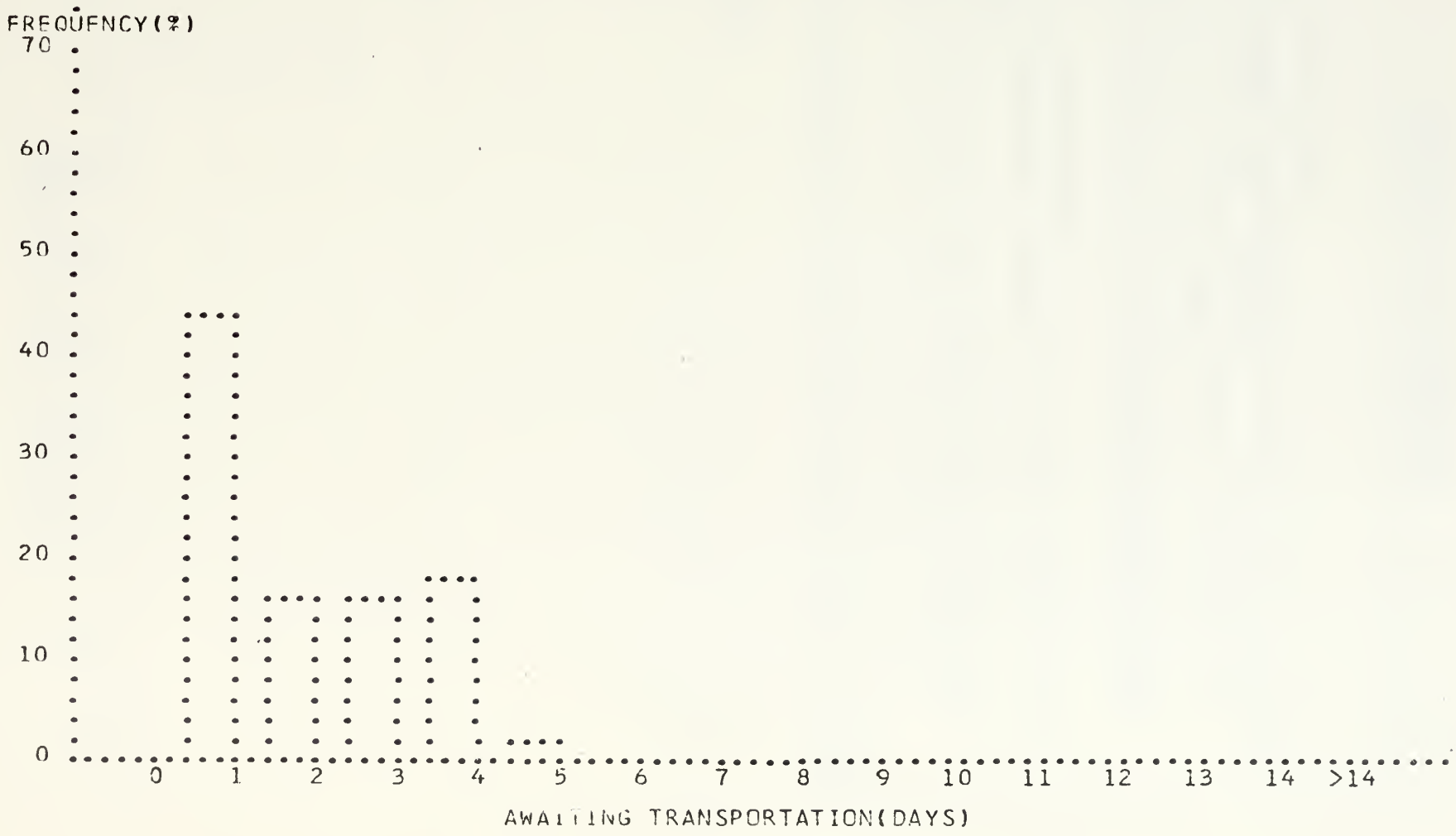
FREQUENCY DISTRIBUTION OF REQUISITION TOTAL THRU-PUT TIME
****ISSUE PRIORITY GROUP TWO****



FREQUENCY DISTRIBUTION OF REQUISITION TOTAL THRU-PUT TIME
****ISSUE PRIORITY GROUP THREE****



FREQUENCY DISTRIBUTION OF TRANSPORTATION STAGING AREA THRU-PUT TIME
(DELAY AWAITING TRANSPORTION)



STATISTICS AND ANALYSIS
CUSTOMER SERVICE EDITING

****QUEUE STATISTICS****

THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCESSED (I.E.,QUEUE LENGTH) WAS 27.35

THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITY TO BE PROCESSED WAS .21 HOURS

THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS 54.0%

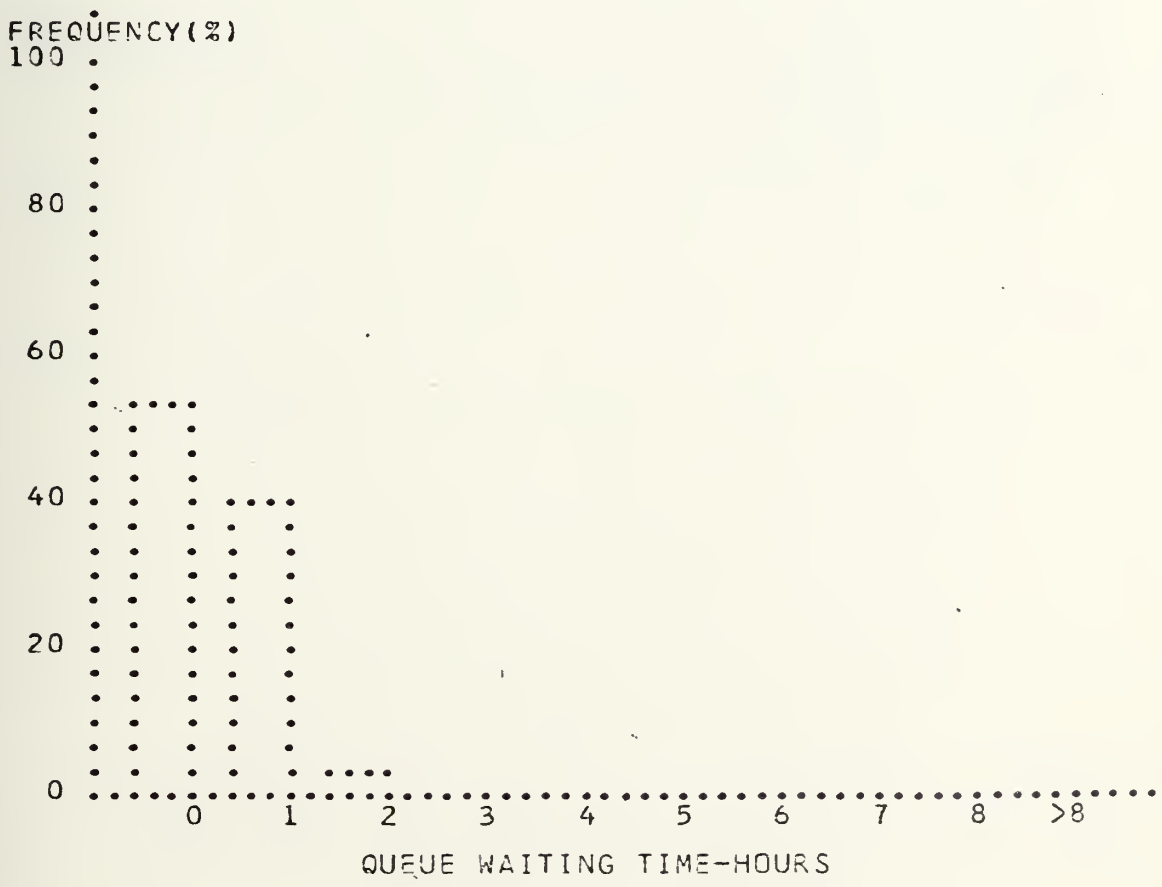
****FACILITY STATISTICS****

THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO THIS FACILITY WAS 2

THE PRODUCTION RATE WAS 273.3 REQUISITIONS PER MAN-HOUR

THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS 55%

FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME IN QUEUE)



STATISTICS AND ANALYSIS
DEMAND EXCEPTION UNIT

****QUEUE STATISTICS****

THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCESSED (I.E..QUEUE LENGTH) WAS 60.04

THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITY TO BE PROCESSED WAS 3.37 HOURS

THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS 4.5%

****FACILITY STATISTICS****

THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO THIS FACILITY WAS 3

THE PRODUCTION RATE WAS 24.9 REQUISITIONS PER MAN-HOUR

THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS 66%

FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME IN QUEUE)

STATISTICS AND ANALYSIS
CUSTOMER SERVICE KEY-PUNCH

****QUEUE STATISTICS****

THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCESSED (I.E..QUEUE LENGTH) WAS 3.56

THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITY TO BE PROCESSED WAS .08 HOURS

THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS 54.4%

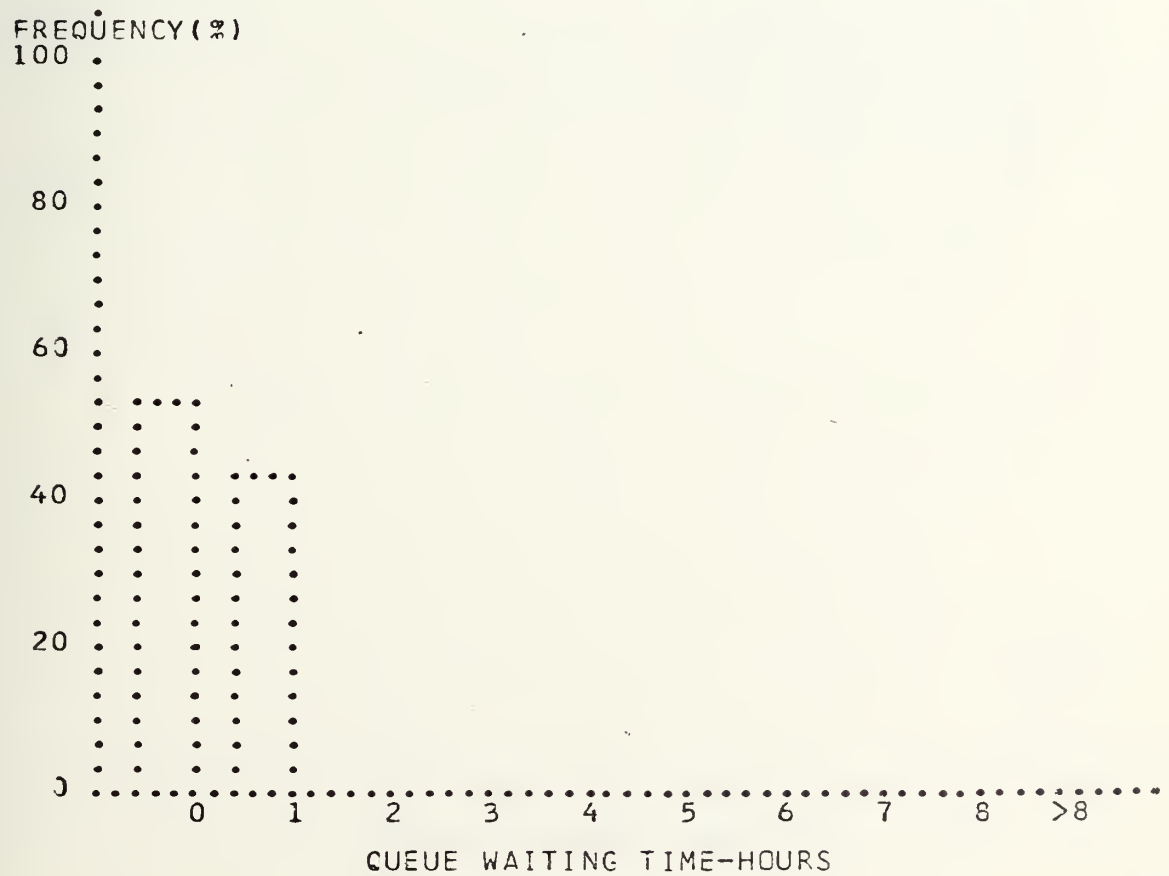
****FACILITY STATISTICS****

THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO THIS FACILITY WAS 2

THE PRODUCTION RATE WAS 89.1 REQUISITIONS PER MAN-HOUR

THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS 52%

FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME IN QUEUE)



STATISTICS AND ANALYSIS
DATA PROCESSING KEY-PUNCH AND VERIFICATION

****QUEUE STATISTICS****

THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCESSED (I.E.,QUEUE LENGTH) WAS 402.45

THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITY TO BE PROCESSED WAS 8.07 HOURS

THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS 8.5%

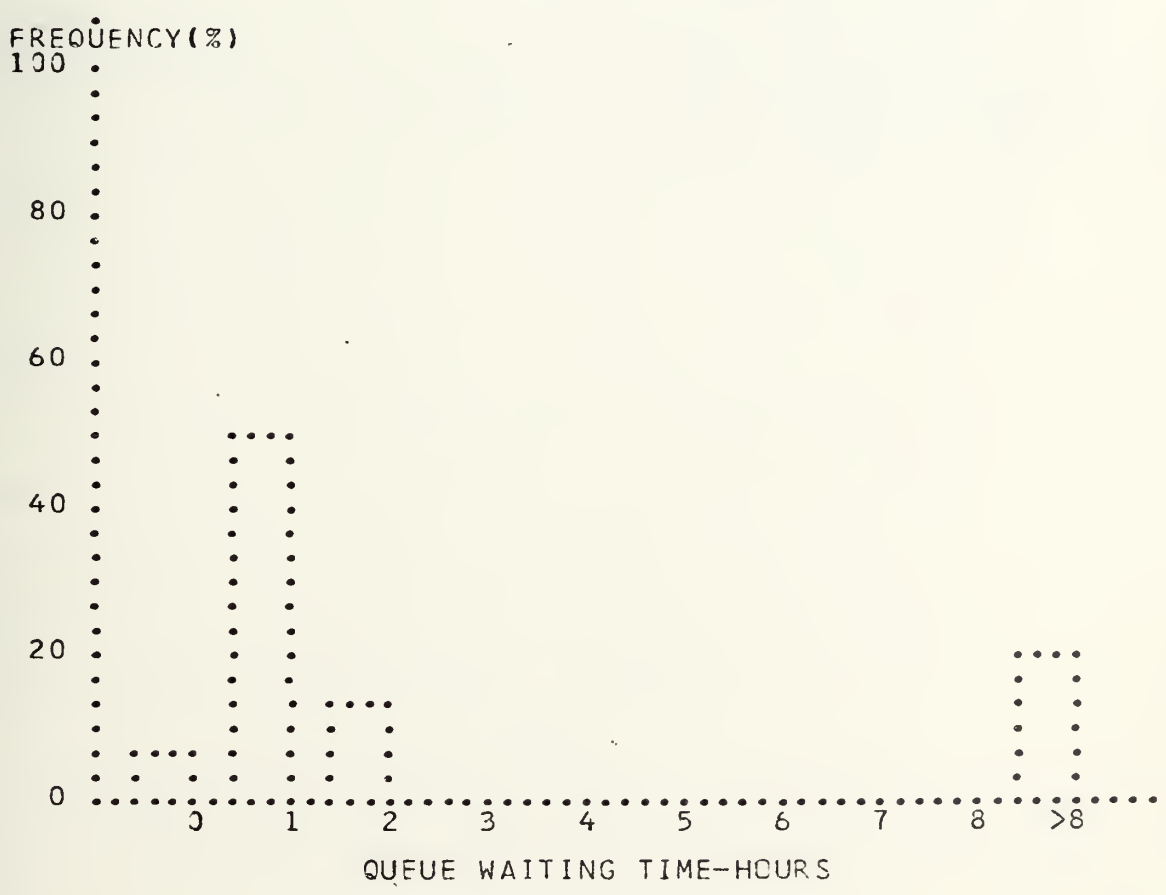
****FACILITY STATISTICS****

THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO THIS FACILITY WAS 4

THE PRODUCTION RATE WAS 104.6 REQUISITIONS PER MAN-HOUR

THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS 55%

FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME IN QUEUE)



STATISTICS AND ANALYSIS
BROADWAY PICKING OPERATION

****QUEUE STATISTICS****

THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCESSED (I.E..QUEUE LENGTH) WAS 127.65

THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITY TO BE PROCESSED WAS 1.72 HOURS

THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS 19.4%

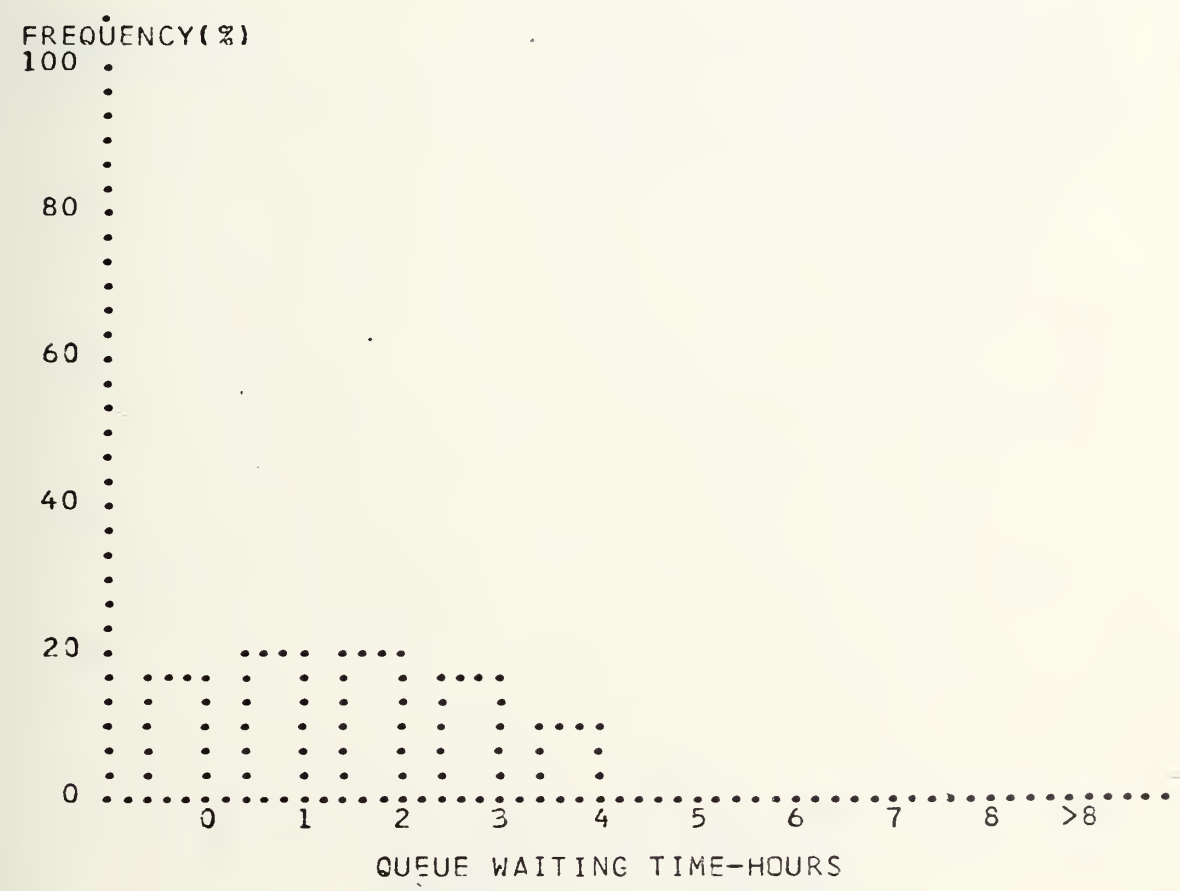
****FACILITY STATISTICS****

THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO THIS FACILITY WAS 34

THE PRODUCTION RATE WAS 9.1 REQUISITIONS PER MAN-HOUR

THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS 51%

FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME IN QUEUE)



STATISTICS AND ANALYSIS
NATIONAL CITY PICKING OPERATION

****QUEUE STATISTICS****

THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCESSED (I.E..QUEUE LENGTH) WAS 32.09

THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITY TO BE PROCESSED WAS 1.40 HOURS

THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS 39.8%

****FACILITY STATISTICS****

THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO THIS FACILITY WAS 26

THE PRODUCTION RATE WAS 3.6 REQUISITIONS PER MAN-HOUR

THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS 49%

FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME IN QUEUE)

STATISTICS AND ANALYSIS
BROADWAY PACKING OPERATION

****QUEUE STATISTICS****

THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCESSED (I.E.,QUEUE LENGTH) WAS 69.29

THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITY TO BE PROCESSED WAS .98 HOURS

THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS 8.4%

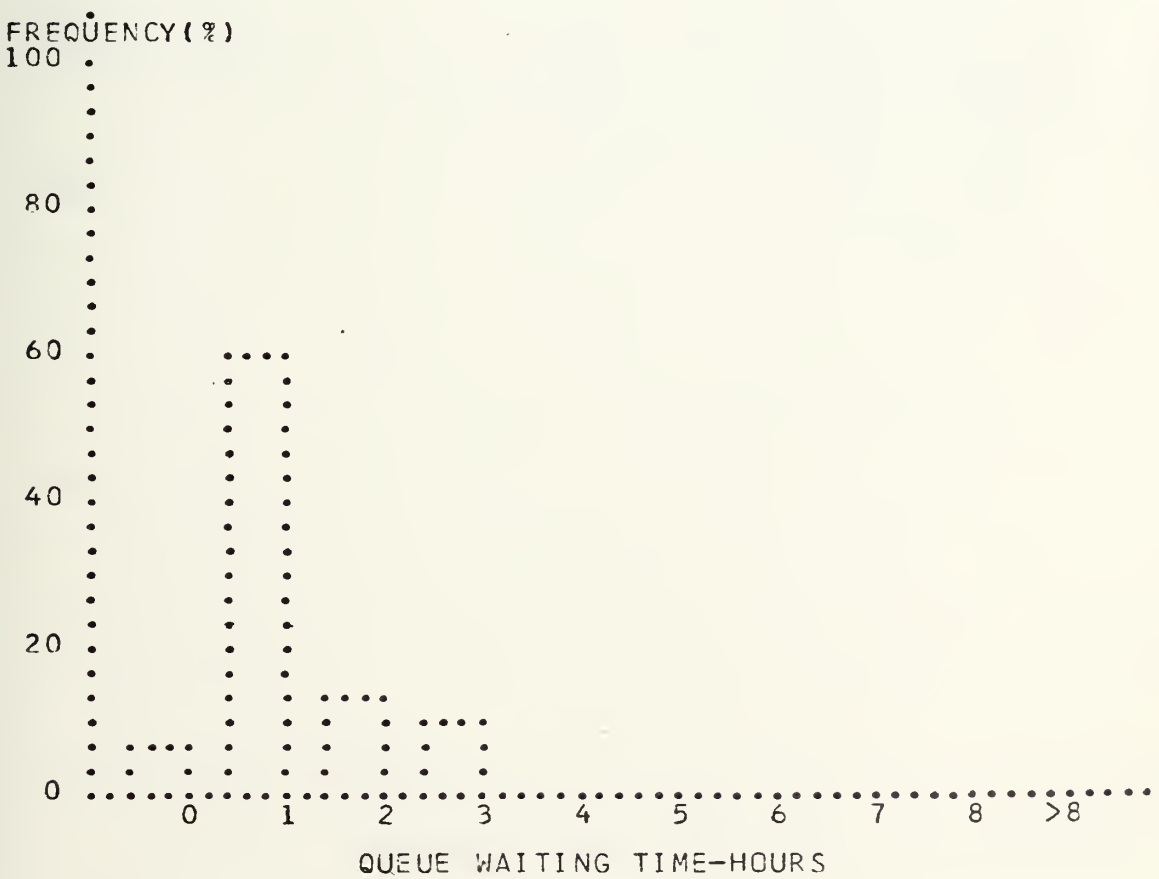
****FACILITY STATISTICS****

THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO THIS FACILITY WAS 13

THE PRODUCTION RATE WAS 22.7 REQUISITIONS PER MAN-HOUR

THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS 65%

FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME IN QUEUE)



STATISTICS AND ANALYSIS
NATIONAL CITY PACKING OPERATION

****QUEUE STATISTICS****

THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCESSED (I.E.,QUEUE LENGTH) WAS 5.36

THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITY TO BE PROCESSED WAS .24 HOURS

THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS 55.0%

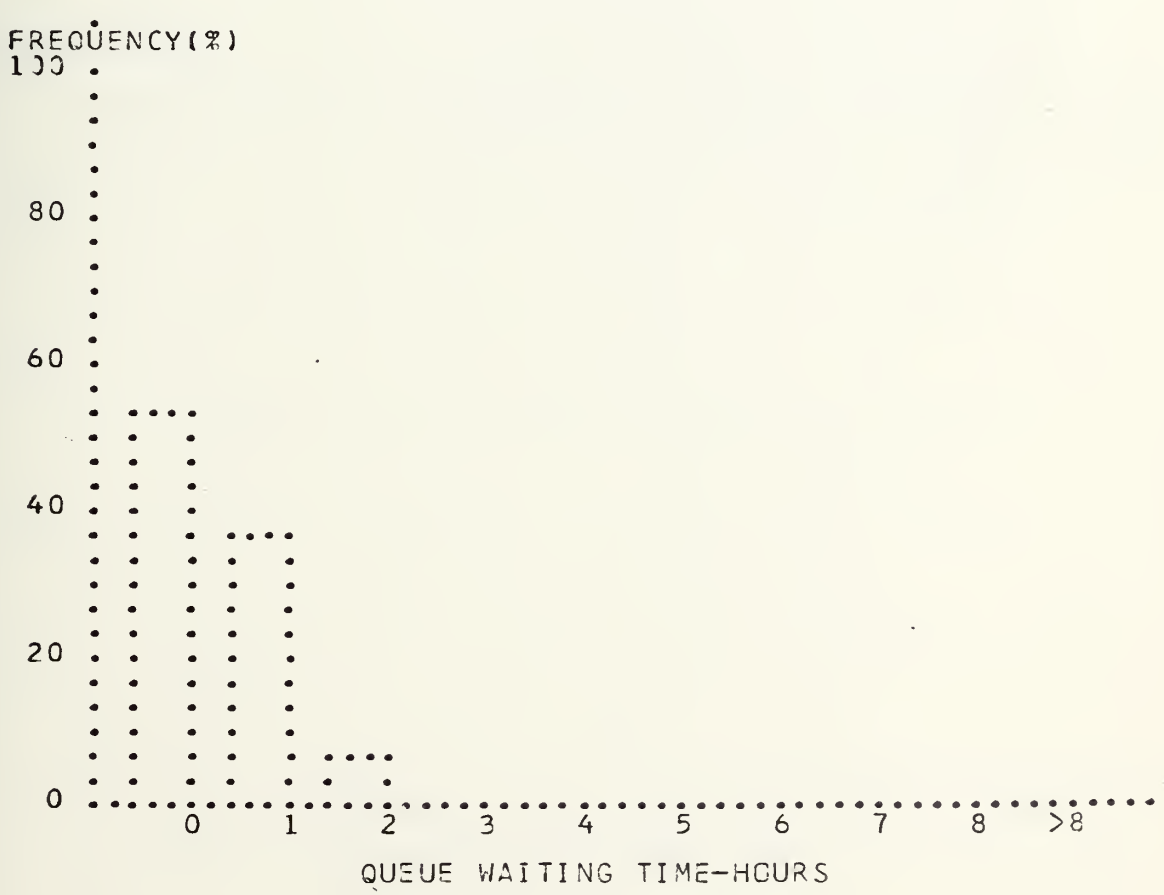
****FACILITY STATISTICS****

THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO THIS FACILITY WAS 11

THE PRODUCTION RATE WAS 8.2 REQUISITIONS PER MAN-HOUR

THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS 35%

FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME IN QUEUE)



STATISTICS AND ANALYSIS
BROADWAY MARKING OPERATION

****QUEUE STATISTICS****

THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCESSED (I.E.,QUEUE LENGTH) WAS 21.31

THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITY TO BE PROCESSED WAS .30 HOURS

THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS 43.3%

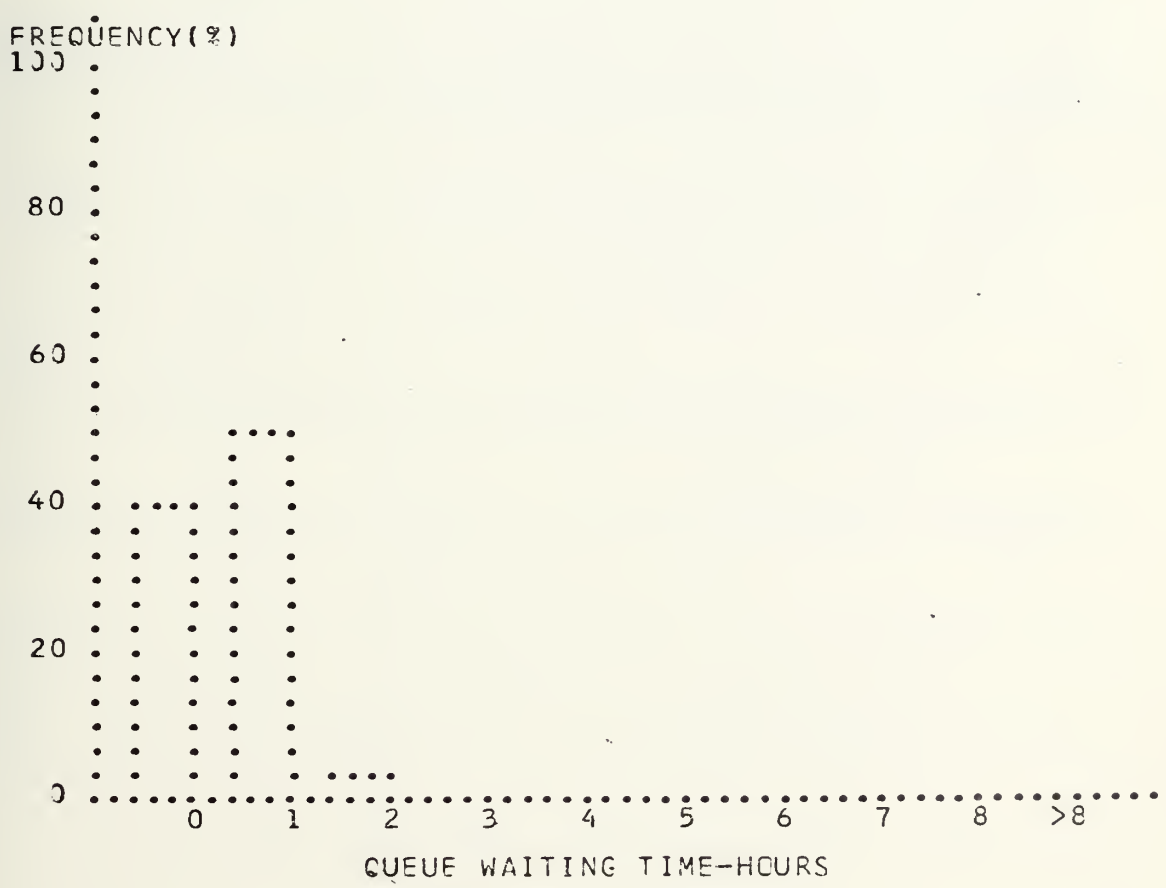
****FACILITY STATISTICS****

THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO THIS FACILITY WAS 3

THE PRODUCTION RATE WAS 98.7 REQUISITIONS PER MAN-HOUR

THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS 53%

FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME IN QUEUE)



STATISTICS AND ANALYSIS
NATIONAL CITY MARKING OPERATION

****QUEUE STATISTICS****

THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCESSED (I.E..QUEUE LENGTH) WAS 14.66

THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITY TO BE PROCESSED WAS .67 HOURS

THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS 16.0%

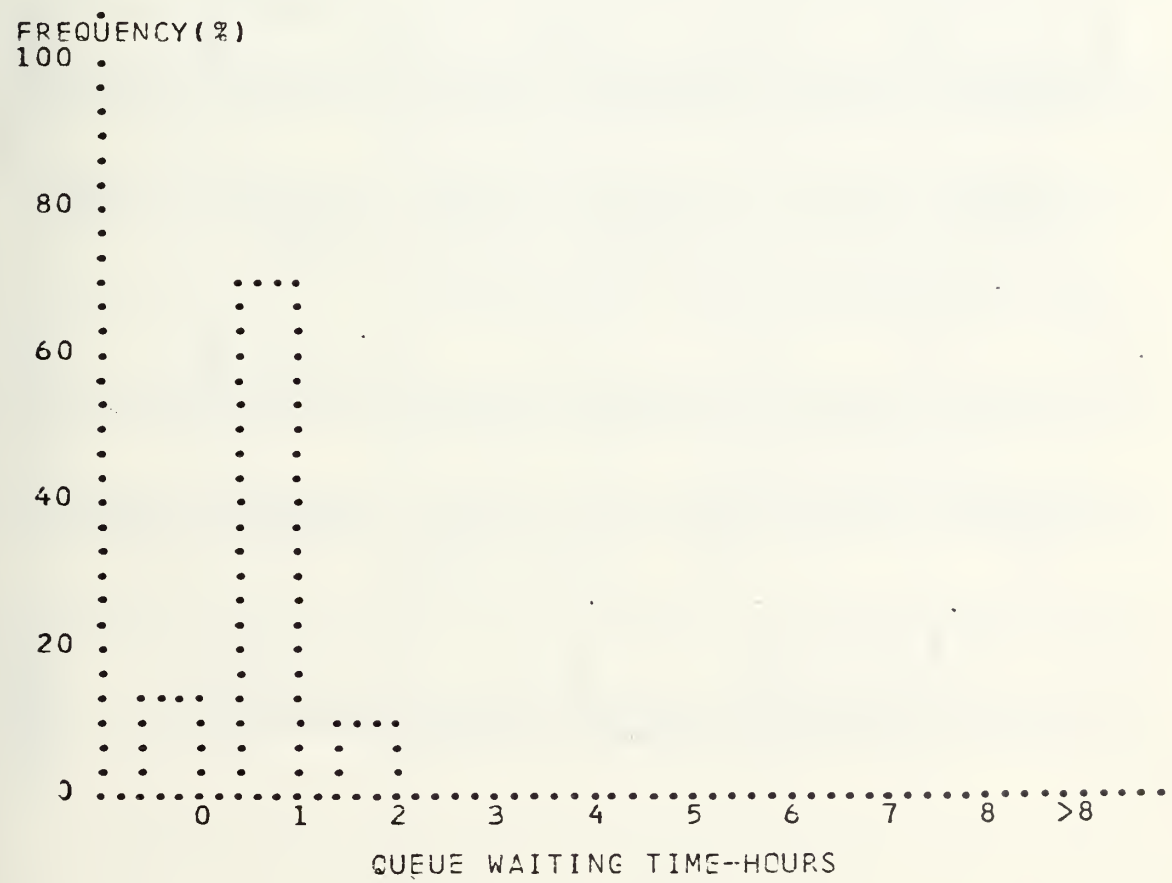
****FACILITY STATISTICS****

THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO THIS FACILITY WAS 4

THE PRODUCTION RATE WAS 22.7 REQUISITIONS PER MAN-HOUR

THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS 57%

FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME IN QUEUE)



IRELATIVE CLOCK 403200 ABSOLUTE CLOCK 470400

BLOCK COUNTS

BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
1	0	24	11	0	120	21	0	12	31	0	65853	41	0	2847
2	0	24	12	0	120	22	0	12	32	0	65853	42	0	21687
3	0	168	13	0	96	23	0	12	33	0	65853	43	0	21687
4	0	2117	14	0	96	24	0	168	34	0	65853	44	0	21687
5	0	168	15	0	96	25	0	168	35	0	65853	45	0	38482
6	0	168	16	0	24	26	0	120	36	0	2837	46	0	38482
7	0	120	17	0	24	27	0	65853	37	0	2837	47	0	38482
8	0	120	18	0	24	28	0	65853	38	0	2837	48	0	36018
9	0	120	19	0	12	29	0	65853	39	0	2847	49	0	13381
10	0	120	20	0	12	30	0	65853	40	0	2847	50	0	13383
BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
51	0	168	61	0	600	71	0	52472	81	0	7177	91	0	19600
52	0	168	62	0	600	72	2	52472	82	0	6849	92	0	17107
53	0	120	63	0	600	73	0	52472	83	0	7177	93	0	17107
54	0	120	64	0	52472	74	0	52472	84	0	7177	94	0	17107
55	0	2016	65	0	52472	75	0	52472	85	0	7177	95	0	17107
56	0	2016	66	0	52472	76	0	57184	86	0	7177	96	0	17107
57	0	1344	67	0	52472	77	0	7177	87	0	7177	97	0	7785
58	0	840	68	0	52472	78	0	7177	88	0	7177	98	0	17107
59	0	600	69	0	24104	79	0	7177	89	0	24664	99	0	17107
60	0	600	70	0	52472	80	0	7177	90	0	22437	100	0	17107
BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
101	0	17108	111	0	32519	121	0	20093	131	0	35271	141	0	29887
102	0	17108	112	0	20096	122	0	20093	132	0	29887	142	0	29887
103	0	17728	113	0	20096	123	0	52836	133	0	29887	143	0	29887
104	0	11695	114	0	20096	124	0	2465	134	0	29887	144	0	29887
105	0	1899	115	0	20096	125	0	26771	135	0	29887	145	0	29887
106	0	1914	116	0	20096	126	0	26771	136	0	29887	146	0	29887
107	0	1465	117	0	18370	127	0	42444	137	0	29887	147	0	29887
108	0	0	118	0	20093	128	0	42444	138	0	24177	148	0	28422
109	0	7882	119	0	20093	129	0	42448	139	0	29887	149	0	26969
110	0	32520	120	4	20093	130	0	42448	140	0	29887	150	0	179
BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
151	0	179	161	0	28434	171	0	28435	181	0	28435	191	0	5589
152	0	122	162	0	28434	172	0	28435	182	0	28435	192	0	9197
153	0	122	163	0	26031	173	0	28435	183	0	16004	193	0	9197
154	0	91	164	0	28434	174	0	28435	184	0	15189	194	0	9197
155	0	91	165	0	28434	175	0	28435	185	0	9197	195	0	9197
156	0	91	166	1	28434	176	0	16096	186	0	9197	196	0	9197
157	0	91	167	0	28435	177	0	28435	187	0	9197	197	0	9197
158	0	28434	168	0	28435	178	0	28435	188	0	9197	198	0	9197
159	0	28434	169	0	744	179	0	28435	189	0	9197	199	0	9197
160	0	28434	170	0	27691	180	0	28435	190	0	9197	200	0	9197
BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
201	0	8748	211	0	8751	221	0	8752	231	0	8752	241	0	120
202	0	8302	212	0	8751	222	0	8752	232	0	8752	242	0	120
203	0	172	213	0	8751	223	0	8752	233	0	8752	243	0	120
204	0	172	214	0	8751	224	0	8752	234	0	8752	244	0	120
205	0	128	215	0	8751	225	0	8752	235	0	7279	245	0	120
206	0	128	216	0	8751	226	0	8752	236	0	22084	246	0	120
207	0	54	217	0	8934	227	0	8752	237	0	22084	247	0	120
208	0	54	218	0	8751	228	0	7345	238	0	22084	248	0	120
209	0	54	219	0	8751	229	0	8752	239	0	168	249	0	120
210	0	54	220	0	8751	230	0	8752	240	0	168	250	0	120
BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
251	0	120	261	0	1918	271	0	24	281	0	168	291	0	24
252	0	120	262	0	1916	272	0	24	282	0	24	292	0	24
253	0	120	263	0	1916	273	0	24	283	0	24	293	0	24
254	0	22080	264	0	13211	274	0	24	284	0	24	294	0	24
255	0	22080	265	0	15113	275	0	24	285	0	24	295	0	168
256	0	39082	266	0	5580	276	0	24	286	0	24	296	0	168
257	0	39082	267	0	22056	277	0	24	287	0	24	297	0	168
258	0	39082	268	0	22056	278	0	24	288	0	24	298	0	168
259	0	1899	269	0	22052	279	0	168	289	0	24	299	0	1320
260	0	1899	270	0	39082	280	0	168	290	0	24	300	0	1320
BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
301	0	120	311	0	24	321	0	24						

302	0	1200	312	0	24	322	0	24
303	0	1200	313	0	240	323	0	24
304	0	1200	314	0	240	324	0	408
305	0	2400	315	0	240	325	0	408
306	0	24000	316	0	240	326	0	408
307	0	24000	317	0	240	327	0	408
308	0	2400	318	0	24	328	0	24
309	0	24	319	0	24			
310	0	24	320	0	24			

STORAGE	CAPACITY	AVERAGE CONTENTS	AVERAGE UTILIZATION	ENTRIES	AVERAGE TIME/TRAN	CURRENT CONTENTS	MAXIMUM CONTENTS
EDIT	2	.848	.424	52474	6.522	2	2
DEWR	3	.761	.253	7177	42.758		3
PUNCH	2	.557	.278	17108	13.139		2
DAPR	4	2.243	.560	20097	45.004	4	4
PICK	34	4.623	.135	29887	62.373		34
NPIC	26	3.320	.127	9197	145.572		26
PACK	13	4.898	.376	28436	69.458	1	13
NPAC	11	1.469	.133	8752	67.700		11
MARK	3	.768	.256	28435	10.901		3
NMAR	4	1.133	.283	8752	52.241		4

QUEUE	MAXIMUM CONTENTS	AVERAGE CONTENTS	TOTAL ENTRIES	ZERO ENTRIES	PERCENT ZEROS	AVERAGE TIME/TRANS	$AVERAGE TIME/TRANS	TABLE NUMBER	CURRENT CONTENTS
EDIT	1030	27.352	524720	283680	54.0	21.017	45.753	7	
DEWR	1260	60.048	71770	3280	4.5	337.351	353.507	9	
PUNCH	380	3.569	171070	93220	54.4	8.413	18.488	8	
DPPUN	4780	402.450	201020	17260	8.5	807.223	883.043	10	90
CPU	6740	3141.298	428290		.0	2957.275	2957.275	11	3810
PICK	4300	127.653	258670	58010	19.4	172.214	213.691	12	
PACK	1190	69.295	284340	24030	8.4	98.262	107.333	13	
MARK	580	21.310	284350	123390	43.3	30.217	53.381	14	
NPIC	1340	32.094	91970	36620	39.8	140.703	233.794	15	
NPAC	260	5.367	87510	48170	55.0	24.732	55.015	16	
NMAR	350	14.669	87520	14070	16.0	67.580	80.525	17	
STAGE	4590	2624.063	223580		.0	4732.183	4732.183	18	2780
20	12820	7055.523	665520	210	.0	4274.531	4275.882		6990

$AVERAGE TIME/TRANS = AVERAGE TIME/TRANS EXCLUDING ZERO ENTRIES

USER CHAIN	TOTAL ENTRIES	AVERAGE TIME/TRANS	CURRENT CONTENTS	AVERAGE CONTENTS	MAXIMUM CONTENTS
1	1466	341.791	1	1.242	8
2	32532	226.354	13	18.263	132
3	7886	228.970	5	4.478	36
AUTO	13388	241.697	5	8.325	61
CPU	42829	2957.275	381	314.129	674
EDIT	24104	45.753		2.735	103
DEWR	6849	353.507		6.004	123
CSPUN	7785	18.488		.356	38
DPPUN	18376	883.043	9	40.245	478
PICK	24177	212.883		12.765	399
PACK	26031	107.333		6.929	119
MARK	16096	53.381		2.131	58
NPIC	5589	231.525		3.209	110
NPAC	3934	55.015		.536	22
NMAR	7345	80.525		1.466	35
CHAIN	22080	38.824		2.126	352
21	1343	6173.128	30	20.561	50
22	1878	6139.277	37	28.595	62
23	1893	4700.496	24	22.068	56
24	18	3753.888		.167	2
25	2682	6503.027	47	43.256	80
26	2626	4681.578	23	30.490	104
27	1281	6511.156	28	23.686	50
28	7028	3869.993	57	67.456	168
29	3583	2982.567	31	26.504	59
30	26	7642.382	1	.492	3

CONTENTS OF FULLWORD SAVEVALUES (NON-ZERO)

SAVEVALUE NR.	VALUE	NR.	VALUE	NR.	VALUE	NR.	VALUE	NR.	VALUE
1	2647	2	4798	3	2523	4	5333	5	4204
6	30591	7	20380	8	9353	9	3858	10	5534
11	122156	12	6914	13	115242	17	72706	19	100072
22	3353	23	26442	24	42911	25	1000	26	634
27	995	31	65853	52	583	53	557	54	609
55	280	56	286	57	321				

CONTENTS OF HALFWORD SAVEVALUES (NON-ZERO)

SAVEVALUE NR.	VALUE	NR.	VALUE	NR.	VALUE	NR.	VALUE	NR.	VALUE	NR.	VALUE	NR.	VALUE	NR.	VALUE
MCSV1	6300	PISV1	2	PISV2	166	NPSV1	2	NPSV2	166	10	1046	11	1	12	2
13	3	14	4	15	1	16	3	17	4	18	4	19	1	31	55
32	66	33	52	34	55	35	51	36	49	37	65	38	35	39	53
40	57	61	2733	62	249	63	891	64	523	65	91	66	36	67	227
68	82	69	987	70	227										

TABLE ARRIV

ENTRIES IN TABLE 65853 — MEAN ARGUMENT 1193.927 — STANDARD DEVIATION 265.000 — SUM OF ARGUMENTS 78623728.000 — NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
700	0	.00	.0	100.0	.586	-1.863
750	77	.11	.1	99.8	.628	-1.675
800	3613	5.48	5.6	94.3	.670	-1.486
850	3633	5.51	11.1	88.8	.711	-1.297
900	3690	5.60	16.7	83.2	.753	-1.109
950	3710	5.63	22.3	77.6	.795	-.920
1000	3650	5.54	27.8	72.1	.837	-.731
1050	3630	5.51	33.4	66.5	.879	-.543
1100	3720	5.64	39.0	60.9	.921	-.354
1150	3609	5.48	44.5	55.4	.963	-.165
1200	3724	5.65	50.1	49.8	1.005	.022
1250	3667	5.56	55.7	44.2	1.046	.211
1300	3610	5.48	61.2	38.7	1.088	.400
1350	3542	5.37	66.6	33.3	1.130	.588
1400	3690	5.60	72.2	27.7	1.172	.777
1450	3678	5.58	77.8	22.1	1.214	.966
1500	3725	5.65	83.4	16.5	1.256	1.154
1550	3665	5.56	89.0	10.9	1.298	1.343
1600	3623	5.50	94.5	5.4	1.340	1.532
1650	3597	5.46	100.0	.0	1.381	1.721

REMAINING FREQUENCIES ARE ALL ZERO

TABLE TIME

ENTRIES IN TABLE 39082 — MEAN ARGUMENT 6743.273 — STANDARD DEVIATION 4416.000 — SUM OF ARGUMENTS 263423440.000 — NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-1.526
2400	8158	20.87	20.8	79.1	.356	-.982
4800	8858	22.66	43.5	56.4	.712	-.439
7200	5152	13.18	56.7	43.2	1.068	.104
9600	7390	18.90	75.6	24.3	1.424	.647
12000	5642	14.43	90.0	9.9	1.780	1.191
14400	2509	6.41	96.4	3.5	2.136	1.734
16800	1021	2.61	99.0	.9	2.492	2.278
19200	206	.52	99.6	.3	2.848	2.821
21600	24	.06	99.6	.3	3.204	3.364
24000	89	.22	99.9	.0	3.560	3.908
26400	29	.07	99.9	.0	3.916	4.451
28800	1	.00	99.9	.0	4.272	4.995
31200	1	.00	99.9	.0	4.628	5.538
33600	2	.00	100.0	.0	4.984	6.082

REMAINING FREQUENCIES ARE ALL ZERO

TABLE WTHRU

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
1899	124.853	329.000	237096.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-.379
2400	1895	99.78	99.7	.2	19.222	6.915
4800	0	.00	99.7	.2	38.445	14.210
7200	4	.21	100.0	.0	57.667	21.504

REMAINING FREQUENCIES ARE ALL ZERO

TABLE IGP1

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
1916	1004.805	1565.000	1925207.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-.642
2400	1797	93.78	93.7	6.2	2.388	.891
4800	0	.00	93.7	6.2	4.777	2.425
7200	119	6.21	100.0	.0	7.165	3.958

REMAINING FREQUENCIES ARE ALL ZERO

TABLE IGP2

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
13211	6885.519	3945.000	90964608.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-1.745
2400	2730	20.66	20.6	79.3	.348	-1.137
4800	2901	21.95	42.6	57.3	.697	-.528
7200	2050	15.51	58.1	41.8	1.045	.079
9600	2410	18.24	76.3	23.6	1.394	.688
12000	2044	15.47	91.8	8.1	1.742	1.296
14400	827	6.25	98.1	1.8	2.091	1.904
16800	204	1.54	99.6	.3	2.439	2.513
19200	36	.27	99.9	.0	2.788	3.121
21600	1	.00	99.9	.0	3.137	3.729
24000	7	.05	99.9	.0	3.485	4.338
26400	1	.00	100.0	.0	3.834	4.946

REMAINING FREQUENCIES ARE ALL ZERO

TABLE IGP3

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
22056	7723.199	4192.000	170342912.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-1.842
2400	1736	7.87	7.8	92.1	.310	-1.269
4800	5957	27.00	34.8	65.1	.621	-.697
7200	2979	13.50	48.3	51.6	.932	-.124
9600	4980	22.57	70.9	29.0	1.243	.447
12000	3598	16.31	87.2	12.7	1.553	1.020
14400	1682	7.62	94.9	5.0	1.864	1.592
16800	817	3.70	98.6	1.3	2.175	2.165
19200	170	.77	99.3	.6	2.486	2.737
21600	23	.10	99.4	.5	2.796	3.310
24000	82	.37	99.8	.1	3.107	3.882
26400	28	.12	99.9	.0	3.418	4.455
28800	1	.00	99.9	.0	3.729	5.027
31200	1	.00	99.9	.0	4.039	5.600
33600	2	.00	100.0	.0	4.350	6.172

REMAINING FREQUENCIES ARE ALL ZERO

TABLE EDIT

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
52472	21.017	116.125	1102846.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	28368	54.06	54.0	45.9	-.000	-.180
100	21459	40.89	94.9	5.0	4.757	.680
200	2437	4.64	99.6	.3	9.515	1.541
300	0	.00	99.6	.3	14.273	2.402
400	0	.00	99.6	.3	19.031	3.263
500	0	.00	99.6	.3	23.789	4.124
600	0	.00	99.6	.3	28.547	4.985
700	0	.00	99.6	.3	33.305	5.846
800	0	.00	99.6	.3	38.062	6.708
OVERFLOW	208	.39	100.0	.0		
AVERAGE VALUE OF OVERFLOW		1666.63				

TABLE PUNCH

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
17107	8.413	85.500	143935.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	9322	54.49	54.4	45.5	-.000	-.398
100	7695	44.98	99.4	.5	11.885	1.071
200	70	.40	99.8	.1	23.770	2.240
300	0	.00	99.8	.1	35.655	3.410
400	0	.00	99.8	.1	47.540	4.579
500	0	.00	99.8	.1	59.426	5.749
600	0	.00	99.8	.1	71.311	6.919
700	0	.00	99.8	.1	83.196	8.088
800	0	.00	99.8	.1	95.081	9.258
OVERFLOW	20	.11	100.0	.0		
AVERAGE VALUE OF OVERFLOW		2011.09				

TABLE DEWR

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
7177	337.351	383.000	2421171.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	328	4.57	4.5	95.4	-.000	-.880
100	1077	15.00	19.5	80.4	.296	-.619
200	1417	19.74	39.3	60.6	.592	-.358
300	1325	18.46	57.7	42.2	.889	-.097
400	911	12.69	70.4	29.5	1.185	.163
500	264	3.67	74.1	25.8	1.482	.424
600	692	9.64	83.7	16.2	1.778	.685
700	595	8.29	92.0	7.9	2.074	.946
800	276	3.84	95.9	4.0	2.371	1.207
OVERFLOW	292	4.06	100.0	.0		
AVERAGE VALUE OF OVERFLOW		1431.19				

TABLE DPPUN

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
20093	806.749	1650.000	16210014.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	1726	8.59	8.5	91.4	-.000	-.488
100	10345	51.48	60.0	39.9	.123	-.428
200	2864	14.25	74.3	25.6	.247	-.367
300	243	1.20	75.5	24.4	.371	-.307
400	304	1.51	77.0	22.9	.495	-.246
500	165	.82	77.8	22.1	.619	-.185
600	113	.56	78.4	21.5	.743	-.125
700	57	.28	78.7	21.2	.867	-.064
800	9	.04	78.7	21.2	.991	-.004
OVERFLOW	4267	21.23	100.0	.0		
AVERAGE VALUE OF OVERFLOW		3557.47				

TABLE CPU

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
42448	2976.933	2007.000	126364896.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-1.483
1200	0	.00	.0	100.0	.403	-.885
2400	33008	77.76	77.7	22.2	.806	-.287
3600	0	.00	77.7	22.2	1.209	.310
4800	0	.00	77.7	22.2	1.612	.908
6000	0	.00	77.7	22.2	2.015	1.506
7200	9440	22.23	100.0	.0	2.418	2.104

REMAINING FREQUENCIES ARE ALL ZERO

TABLE PICK

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
29887	172.214	160.312	5146982.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	5801	19.40	19.4	80.5	-.000	-1.074
100	6339	21.20	40.6	59.3	.580	-.450
200	6503	21.75	62.3	37.6	1.161	.173
300	5383	18.01	80.3	19.6	1.742	.797
400	3617	12.10	92.4	7.5	2.322	1.420
500	939	3.14	95.6	4.3	2.903	2.044
600	431	1.44	97.0	2.9	3.484	2.668
700	656	2.19	99.2	.7	4.064	3.292
800	209	.69	99.9	.0	4.645	3.916
OVERFLOW	9	.03	100.0	.0		

AVERAGE VALUE OF OVERFLOW 808.88

TABLE PACK

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
28434	98.262	171.250	2793994.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	2403	8.45	8.4	91.5	-.000	-.573
100	17476	61.46	69.9	30.0	1.017	.010
200	4690	16.49	86.4	13.5	2.035	.594
300	3432	12.07	98.4	1.5	3.053	1.178
400	171	.60	99.0	.9	4.070	1.761
500	1	.00	99.0	.9	5.088	2.345
600	0	.00	99.0	.9	6.106	2.929
700	0	.00	99.0	.9	7.123	3.513
800	9	.03	99.0	.9	8.141	4.097
OVERFLOW	261	.91	100.0	.0		

AVERAGE VALUE OF OVERFLOW 1690.55

TABLE MARK

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
28435	30.217	186.687	859221.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	12339	43.39	43.3	56.6	-.000	-.161
100	14677	51.61	95.0	4.9	3.309	.373
200	1166	4.10	99.1	.8	6.618	.909
300	37	.13	99.2	.7	9.928	1.445
400	0	.00	99.2	.7	13.237	1.980
500	0	.00	99.2	.7	16.546	2.516
600	0	.00	99.2	.7	19.856	3.052
700	0	.00	99.2	.7	23.165	3.587
800	0	.00	99.2	.7	26.475	4.123
OVERFLOW	216	.75	100.0	.0		

AVERAGE VALUE OF OVERFLOW 1804.11

TABLE NPIC
ENTRIES IN TABLE 9197 MEAN ARGUMENT 140.703 STANDARD DEVIATION 154.312 SUM OF ARGUMENTS 1294050.000 NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	3662	39.81	39.8	60.1	-.000	-.911
100	283	3.07	42.8	57.1	.710	-.263
200	2754	29.94	72.8	27.1	1.421	.384
300	1642	17.85	90.6	9.3	2.132	1.032
400	50	.54	91.2	8.7	2.842	1.680
500	615	6.68	97.9	2.0	3.553	2.328
600	17	.18	98.1	1.8	4.264	2.976
700	168	1.82	99.9	.0	4.975	3.624
800	4	.04	99.9	.0	5.685	4.272
OVERFLOW	2	.02	100.0	.0		

AVERAGE VALUE OF OVERFLOW 825.00

TABLE NPAC
ENTRIES IN TABLE 8751 MEAN ARGUMENT 24.732 STANDARD DEVIATION 37.437 SUM OF ARGUMENTS 216430.000 NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	4817	55.04	55.0	44.9	-.000	-.660
100	3298	37.68	92.7	7.2	4.043	2.010
200	631	7.21	99.9	.0	8.086	4.681
300	5	.05	100.0	.0	12.130	7.352

REMAINING FREQUENCIES ARE ALL ZERO

TABLE NMAR
ENTRIES IN TABLE 8752 MEAN ARGUMENT 67.580 STANDARD DEVIATION 179.500 SUM OF ARGUMENTS 591462.000 NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	1407	16.07	16.0	83.9	-.000	-.376
100	6155	70.32	86.4	13.5	1.479	.180
200	990	11.31	97.7	2.2	2.959	.737
300	83	.94	98.6	1.3	4.439	1.294
400	0	.00	98.6	1.3	5.918	1.851
500	0	.00	98.6	1.3	7.398	2.409
600	0	.00	98.6	1.3	8.878	2.966
700	0	.00	98.6	1.3	10.358	3.523
800	0	.00	98.6	1.3	11.837	4.080
OVERFLOW	117	1.33	100.0	.0		

AVERAGE VALUE OF OVERFLOW 1553.51

TABLE STAGE
ENTRIES IN TABLE 22080 MEAN ARGUMENT 4786.886 STANDARD DEVIATION 3047.000 SUM OF ARGUMENTS 105694496.000 NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-1.571
2400	9815	44.45	44.4	55.5	.501	-.783
4800	3922	17.76	62.2	37.7	1.002	.004
7200	3682	16.67	78.8	21.1	1.504	.791
9600	4027	18.23	97.1	2.8	2.005	1.579
12000	628	2.84	99.9	.0	2.506	2.367
14400	5	.02	99.9	.0	3.008	3.154
16800	1	.00	100.0	.0	3.509	3.942

REMAINING FREQUENCIES ARE ALL ZERO

TABLE SUN

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
24	-.000	.000	.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	24	100.00	100.0	.0	-.000	-.000

REMAINING FREQUENCIES ARE ALL ZERO

TABLE MON

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
24	6091.664	2328.000	146200.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-2.616
500	0	.00	.0	100.0	.082	-2.401
1000	0	.00	.0	100.0	.164	-2.187
1500	0	.00	.0	100.0	.246	-1.972
2000	0	.00	.0	100.0	.328	-1.757
2500	0	.00	.0	100.0	.410	-1.542
3000	0	.00	.0	100.0	.492	-1.328
3500	0	.00	.0	100.0	.574	-1.113
4000	2	8.33	8.3	91.6	.656	-.898
4500	4	16.66	24.9	75.0	.738	-.683
5000	4	16.66	41.6	58.3	.820	-.468
5500	5	20.83	62.4	37.5	.902	-.254
6000	2	8.33	70.8	29.1	.984	-.039
6500	0	.00	70.8	29.1	1.067	.175
7000	0	.00	70.8	29.1	1.149	.390
7500	0	.00	70.8	29.1	1.231	.604
8000	0	.00	70.8	29.1	1.313	.819
8500	2	8.33	79.1	20.8	1.395	1.034
9000	1	4.16	83.3	16.6	1.477	1.249
OVERFLOW	4	16.66	100.0	.0		

AVERAGE VALUE OF OVERFLOW 10327.50

TABLE TUE

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
24	4437.914	615.000	106510.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-7.216
500	0	.00	.0	100.0	.112	-6.403
1000	0	.00	.0	100.0	.225	-5.590
1500	0	.00	.0	100.0	.337	-4.777
2000	0	.00	.0	100.0	.450	-3.964
2500	0	.00	.0	100.0	.563	-3.151
3000	0	.00	.0	100.0	.675	-2.338
3500	2	8.33	8.3	91.6	.788	-1.525
4000	5	20.83	29.1	70.8	.901	-.712
4500	4	16.66	45.8	54.1	1.013	.100
5000	9	37.50	83.3	16.6	1.126	.913
5500	4	16.66	100.0	.0	1.239	1.726

REMAINING FREQUENCIES ARE ALL ZERO

TABLE WED

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
24	5382.914	1454.000	129190.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-3.702
500	0	.00	.0	100.0	.092	-3.358
1000	0	.00	.0	100.0	.185	-3.014
1500	0	.00	.0	100.0	.278	-2.670
2000	0	.00	.0	100.0	.371	-2.326
2500	0	.00	.0	100.0	.464	-1.982
3000	0	.00	.0	100.0	.557	-1.638

3500	1	4.16	4.1	95.8	.650	-1.294
4000	2	8.33	12.4	87.5	.743	-.951
4500	7	29.16	41.6	58.3	.835	-.607
5000	0	.00	41.6	58.3	.928	-.263
5500	3	12.50	54.1	45.8	1.021	.080
6000	6	25.00	79.1	20.8	1.114	.424
6500	1	4.16	83.3	16.6	1.207	.768
7000	0	.00	83.3	16.6	1.300	1.112
7500	0	.00	83.3	16.6	1.393	1.456
8000	1	4.16	87.4	12.5	1.486	1.799
8500	3	12.50	100.0	.0	1.579	2.143

REMAINING FREQUENCIES ARE ALL ZERO

TABLE THU

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
24	5270.000	1269.000	126480.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-4.152
500	0	.00	.0	100.0	.094	-3.758
1000	0	.00	.0	100.0	.189	-3.364
1500	0	.00	.0	100.0	.284	-2.970
2000	0	.00	.0	100.0	.379	-2.576
2500	0	.00	.0	100.0	.474	-2.182
3000	0	.00	.0	100.0	.569	-1.788
3500	0	.00	.0	100.0	.664	-1.394
4000	1	4.16	4.1	95.8	.759	-1.000
4500	6	25.00	29.1	70.8	.853	-.606
5000	6	25.00	54.1	45.8	.948	-.212
5500	6	25.00	79.1	20.8	1.043	.181
6000	0	.00	79.1	20.8	1.138	.575
6500	0	.00	79.1	20.8	1.233	.969
7000	0	.00	79.1	20.8	1.328	1.363
7500	2	8.33	87.4	12.5	1.423	1.757
8000	3	12.50	100.0	.0	1.518	2.151

REMAINING FREQUENCIES ARE ALL ZERO

TABLE FRI

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
24	6256.250	931.000	150150.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	0	.00	.0	100.0	-.000	-6.719
500	0	.00	.0	100.0	.079	-6.182
1000	0	.00	.0	100.0	.159	-5.645
1500	0	.00	.0	100.0	.239	-5.108
2000	0	.00	.0	100.0	.319	-4.571
2500	0	.00	.0	100.0	.399	-4.034
3000	0	.00	.0	100.0	.479	-3.497
3500	0	.00	.0	100.0	.559	-2.960
4000	0	.00	.0	100.0	.639	-2.423
4500	0	.00	.0	100.0	.719	-1.886
5000	0	.00	.0	100.0	.799	-1.349
5500	5	20.83	20.8	79.1	.879	-.812
6000	7	29.16	49.9	50.0	.959	-.275
6500	4	16.66	66.6	33.3	1.038	.261
7000	4	16.66	83.3	16.6	1.118	.798
7500	0	.00	83.3	16.6	1.198	1.335
8000	2	8.33	91.6	8.3	1.278	1.872
8500	1	4.16	95.8	4.1	1.358	2.410
9000	1	4.16	100.0	.0	1.438	2.947

REMAINING FREQUENCIES ARE ALL ZERO

TABLE SAT

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
24	-.000	.000	.000	NON-WEIGHTED

UPPER	OBSERVED	PER CENT	CUMULATIVE	CUMULATIVE	MULTIPLE	DEVIATION

LIMIT	FREQUENCY	OF TOTAL	PERCENTAGE	REMAINDER	OF MEAN	FROM MEAN
0	24	100.00	100.0	.0	-.000	-.000

REMAINING FREQUENCIES ARE ALL ZERO

TABLE WEEK

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS	
168	3919.821	2813.000	658530.000	NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
0	48	28.57	28.5	71.4	-.000	-1.393
500	0	.00	28.5	71.4	.127	-1.215
1000	0	.00	28.5	71.4	.255	-1.037
1500	0	.00	28.5	71.4	.382	-.860
2000	0	.00	28.5	71.4	.510	-.682
2500	0	.00	28.5	71.4	.637	-.504
3000	0	.00	28.5	71.4	.765	-.326
3500	3	1.76	30.3	69.6	.892	-.149
4000	10	5.95	36.3	63.6	1.020	.028
4500	21	12.50	48.8	51.1	1.148	.206
5000	19	11.30	60.1	39.8	1.275	.383
5500	23	13.69	73.8	26.1	1.403	.561
6000	15	8.92	82.7	17.2	1.530	.739
6500	5	2.97	85.7	14.2	1.658	.917
7000	4	2.38	88.0	11.9	1.785	1.094
7500	2	1.19	89.2	10.7	1.913	1.272
8000	6	3.57	92.8	7.1	2.040	1.450
8500	6	3.57	96.4	3.5	2.168	1.628
9000	2	1.19	97.6	2.3	2.296	1.805
OVERFLOW	4	2.38	100.0	.0		

AVERAGE VALUE OF OVERFLOW 10327.50

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*.....................................................................
*          REQUISITION THROUGH-PUT TIME SIMULATION
*               NAVAL SUPPLY CENTER,SAN DIEGO
*.....................................................................
*
        SIMULATE
        GENERATE    16800,,,,,0    SIMULATE ONE WEEKS ACTIVITY
        TERMINATE   1              IN STEPS OF 0.01 HOURS
*
*
*
*.....................................................................
*       THE INPUT SECTION
*.....................................................................
*
*   ****INPUT VARIABLES****
*
 AUTOI  VARIABLE    223
 DEEX   VARIABLE    170
 DEWRP  VARIABLE    27
 DRIVE  VARIABLE    12
 EDITP  VARIABLE    2
 GROSS  VARIABLE    655
 MRSS   VARIABLE    113500
 PREP   VARIABLE    385
 PUNP   VARIABLE    6
 NCPER  VARIABLE    230
*
*   ****INPUT STORAGE CAPACITIES****
*
  EDIT  STORAGE     2              (1)
  DEWR  STORAGE     3              (2)
 PUNCH  STORAGE     2              (3)
  DAPR  STORAGE     4              (4)
  PICK  STORAGE     34             (5)
  NPIC  STORAGE     26             (6)
  PACK  STORAGE     13             (7)
  NPAC  STORAGE     11             (8)
  MARK  STORAGE     3              (9)
  NMAR  STORAGE     4              (10)
*   ***CAUTION*** KEEP STORAGE CARDS IN SEQUENCE
*
*   ****INPUT FUNCTIONS****
*
 FPIC1  FUNCTION    P2,D5          ASSIGN ISSUE TIMES
1,68/2,45/3,73/4,67/7,145
 GENF2  FUNCTION    RN1,D8         ASSIGN LOT NUMBERS
.043,1/.084,2/.411,3/.491,4/.741,5/.905,6/.962,7/1.0,8
 NMKF1  FUNCTION    P1,D6          ASSIGN N/C MARK WORK STDS
0,12/1,30/2,30/10,25/20,25/21,0
  MKF1  FUNCTION    P1,D6
0,0/1,32/2,27/10,26/20,20/21,0
 PACF1  FUNCTION    P1,D6
0,20/1,230/2,34/10,0/20,0/21,40
 STAF1  FUNCTION    RN1,D10
.06,21/.142,22/.226,23/.227,24/.345,25/.465,26/.518,27/
.835,28/.999,29/1.0,30
*
*
*   ****DEFINITIONS****
*
*MRSS   VARIABLE
*   ***CAUTION*** DO NOT INPUT LESS THAN 63000 REQNS
*   MATERIAL REQUESTS FOR STANDARD STOCK ITEMS,LINE 03,NAVSUP
*   FORM 1144 MONTHLY REPORT
*
*
*       PROCESSING TIMES AT WORK STATIONS
*
*
*   TIMES ARE ENTERED IN THOUSANDS OF AN HOUR PER TRANSACTION
*
```

```
*EDITP VARIABLE
*   THIS IS THE TIME TO PROCESS ONE INCOMING TRANSACTION IN
*   CUSTOMER SERVICES EDITING.  CURRENTLY ONE CLERK HANDLES
*   THE TOTAL INCOMING WORKLOAD WITH VIRTUALLY NO BACKLOG AS
*   EVIDENCED FROM CUSTOMER SERVICE MONTHLY FEEDER REPORTS.
*   WHEN THIS WORK AREA WAS ON DIMES STANDARDS, THE PROCESS-
*   ING RATE WAS 100/HOUR/CLERK.  THE PROCESSING RATE USED IS
*   FROM DATA FROM THE MONTHLY SUPPLY DIST. AND INV CONTROL
*   OPERATIONS REPORT (NAVSUP FORM 1144), WHERE THE
*   AVG WORK UNITS FROM LINE 3 LESS AUTODIN DIVIDED BY AVG
*   MANHOURS GAVE AN AVG UPPER HALF MH/WU = .002 THEREFORE
*   STANDARD USED IN MODEL IS .002 HRS/TRANS/CLERK
*
*DEWRP VARIABLE
*   REFERENCE IS DIMES CUSTOMER SERVICE DIVISION SURVEY, JULY
*   1970.  THIS IS THE TIME FOR ONE SUPPLY CLERK TO PROCESS A
*   DEMAND EXCEPTION OR WAREHOUSE REFUSAL,.0271 STD HRS/TRANS
*
*PUNP  VARIABLE
*   THIS IS THE TIME REQUIRED TO KEYPUNCH ONE DOCUMENT ON IBM
*   029/026/870 IN CUSTOMER SERVICES ,REF IS DIMES CUSTOMER
*   SERVICES STUDY, JULY 1970, OR THE TIME TO KEYPUNCH ONE
*   1348 IN DATA PROCESSING, REF IS DIMES ADPE OPERATIONS
*   DIVISION STUDY, 29 MARCH 1968
*   STD USED IN MODEL IS .006 HRS/TRANS
*
*FPIC1 FUNCTION                  ASSIGN ISSUE TIMES
*   DATA SOURCE-DIMES WORK UNIT STDS,12 JUL 68
*   P2 CODE    TITLE                 STD HRS
*         1    ISSUE,BIN,HOTLINE     .0680
*         2    ISSUE,BIN             .0450
*         3    ISSUE,BULK            .0730
*         7    ISSUE,BULK,NATL CITY.1454
*
*
*PACF1 FUNCTION
*   DATA SOURCE-DIMES MAR 69
*   DIMES STANDARDS FOR PACKING
*   AVG L/I PER PACK IS 3.46
*   P1 CODE  PACK              STD HRS/PACK   STD HRS/LINE
*    2       LIGHT             .1174          .0339
*   20       A/R LIGHT         .0000          .0000
*   21       ROUGH/LOCAL       .1359          .0392
*    1       HEAVY             .7939          .2290
*   10       A/R HEAVY         .0000          .0000
*    0       PARCEL POST       .0623          .0180
*
* MKF1 FUNCTION
*NMKF1 FUNCTION
*   DATA SOURCE-DIMES MAR 69
*   DIMES STANDARDS FOR MARKING
*   AVG L/I PER PACK IS 3.46
*   P1 CODE  PACK              STD HRS/PACK   STD HRS/LINE
*    2       LIGHT             .0939          .0271
*   20       A/R LIGHT         .0683          .0197
*   21       ROUGH/LOCAL       .0000          .0000
*    1       HEAVY             .1120          .0324
*   10       A/R HEAVY         .0922          .0257
*
*       STORAGE CAPACITIES
*
*EDIT  STORAGE                  2 EDITORS HANDLE LOAD
*   THIS IS THE NO. OF WORKERS CURRENTLY EMPLOYED IN EDITING
*   INCOMING REQUISITIONS IN CUSTOMER SERVICES.
*
*DEWR  STORAGE
*   THIS IS THE NO. OF WORKERS CURRENTLY EMPLOYED IN PROCESS-
*   ING THE DEMAND EXCEPTIONS AND WAREHOUSE REFUSALS THAT ARE
*   RETURNED TO CUSTOMER SERVICES.
*
*PUNCH STORAGE                  CUSTOMER SERVICES PUNCH
*   THIS IS THE NUMBER OF KEYPUNCHES AVAILABLE IN THE CUS-
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*  TOMER SERVICES DIVISION AT BROADWAY.
*
*DAPR  STORAGE                    DATA PROCESSING PUNCHING
*  THIS IS THE NUMBER OF KEYPUNCH OPERATORS IN DATA PROCESS-
*  ING THAT ARE READY TO PUNCH AND VERIFY 1348 TRANSACTIONS.
*  REF IS DIMES ADPE OPERATIONS DIVISION STUDY, 29 MARCH
*  1968.  THE AVG DAILY HOURS FOR 1348 PUNCH AND VERIFY WORK
*  LOAD=24.46 HRS.  THE TOTAL DAILY WORK UNIT STANDARD HOURS
*  =165.59 HRS.  THE TOTAL CARD PUNCH OPERATORS, 2 SECTIONS
*  =23.  (24.46/165.59)(23) =3.26 OR 4 OPERATORS.
*
* PICK STORAGE
* NPIC STORAGE
*  NUMBER OF WORKERS CURRENTLY ENGAGED IN PICKING MATERIAL
*  AT NATIONAL CITY AND BROADWAY.  REF IS DIMES STORAGE
*  DIVISION SURVEYS, JULY 1968
*
* PACK STORAGE
* NPAC STORAGE
*  NUMBER OF WORKERS CURRENTLY ENGAGED IN PACKING AT BWDY
*  AND NATIONAL CITY.  REF IS DIMES PACKING AND PRESERVATION
*  BRANCH SURVEYS, MARCH 1969
*
* MARK STORAGE
* NMAR STORAGE
*  NUMBER OF WORKERS CURRENTLY ENGAGED IN MARKING AT BROAD-
*  WAY AND NATIONAL CITY.  REF IS DIMES PACKING AND PRESER-
*  VATION SURVEYS, MARCH 1969.
*
*DRIVE VARIABLE
*  ENTER THE AVERAGE NUMBER OF DRIVERS AVAILABLE FOR LOCAL
*  DELIVERY OF SUPPLIES
*
*
*       OTHER VARIABLES AND FUNCTIONS
*
*
*AUTOI VARIABLE
*  THIS IS THE PARTS PER THOUSAND OF AVG INPUT THAT IS AUTO-
*  DIN INPUT.  OBSERVED FROM CUSTOMER SERVICES MONTHLY INPUT
*  FEEDER REPORTS FOR JUN-SEPT 1972.
*
*GROSS VARIABLE
*  THIS IS THE GROSS MATERIAL AVAILABILITY AT NSC SAN DIEGO
*  DEFINED AS LINE 07/LINE 03,NAVSUP FORM 1144
*
*PREP  VARIABLE
*  THIS IS THE PARTS PER THOUSAND OF CUSTOMER INPUT 1348'S
*  THAT ARE RECEIVED PREPUNCHED AT CUSTOMER SERVICES. THE
*  AVG INPUT/WORKDAY WAS OBTAINED FROM THE CUSTOMER SERVICE
*  INPUT FEEDER REPORTS FOR JUN-SEP 1972.  FROM THE DATA
*  PROCESSING KEY PUNCH RECORD CONTENT SHEETS FOR JUN-SEP
*  1972 THE AVG 1348'S PUNCHED/WORKDAY WERE OBTAINED.
*
*DEEX  VARIABLE
*  THIS IS THE PARTS PER THOUSAND OF LOTTED GP3 AND GP2
*  TRANSACTIONS THAT ARE RETURNED FOR PROCESSING AS A DEMAND
*  EXCEPTION OR WAREHOUSE REFUSAL.  REF IS CUSTOMER SERVICE
*  MONTHLY FEEDER REPORTS FOR JUN-SEP 1972.
*
*NCPER VARIABLE
*  THIS IS THE % GP1/WT TRANS GOING TO NATIONAL CITY
*
*GENF2 FUNCTION   RN1,D8       ASSIGN LOT NUMBERS
*  THIS FUNCTION ASSIGNS A LOT NUMBER TO EACH TRANSACTION
*  THIS IS DONE IN AGREEMENT WITH THE ISSUE GROUP PRIORITIES
*  PERCENTAGES AS OBTAINED FROM CUSTOMER SERVICES DIVISION
*  FEEDER INPUT REPORTS JUN-JUL-AUG-SEP 72
*                              LOT         TYPE        MIX
*                              1           IGP1         4.3%
*                              2           BEAR         4.1%
*                              3           IGP2        32.7%
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*                                   4          HOTSHIPS   8.0%
*                                   5          IGP3-1    25.0%
*                                   6          IGP3-2    16.4%
*                                   7          IGP3-3     5.7%
*                                   8          COLD STR   3.8%
*
*
*STAF1 FUNCTION   RN1,D10
*  DELIVERY ZONE DISTRIBUTION-DATA SOURCE TRANS STUDY,DEC 71
*
*
*.....................................................................
*  MASTER CLOCK-CONTROLS WORKING HOURS,LUNCH BREAKS,ETC
*.....................................................................
*
*  GENERATE A DAY OF THE WEEK COUNT
*
*  TEST FOR WORKDAY-KILL TRANSACTION IF SAT OR SUN
*
   DAY VARIABLE   N$DAYG@7     MON=1,TUE=2,WED=3,THU=4,FRI=5
*                              SAT=6,SUN=0
  DAYV BVARIABLE  (V$DAY'LE'5)*(V$DAY'NE'0)  TRUE=>WORKDAY
  DAYG GENERATE   2400,,1,,,0
  KILL TERMINATE
*
*  PLACE DELAYS IN ADVANCE BLOCKS BY ADDING SAVEVALUE MCSV1
*
*  WORK STARTS AT 0730 HOURS
       GENERATE   2400,0,750,,6
       TEST F     BV$DAYV,K1,KILL  KILL IF SAT OR SUN
 COUNT SAVEVALUE  MCSV1,K0,H
*
*  LUNCH FROM 1130 TO 1230
*
       ADVANCE    400           TRANS DEPART TIME IS 1130 HRS
       SAVEVALUE  MCSV1,K100,H
       ADVANCE    100           TRANS DEPART TIME IS 1230 HRS
       SAVEVALUE  MCSV1,K0,H
*
*  WORK STOPS AT 1630 HRS
       TEST NE    V$DAY,K5,KILL KILL ON FRIDAYS
       ADVANCE    400           TRANS DEPART TIME IS 1630 HRS
       SAVEVALUE  MCSV1,K1500,H
       TERMINATE
*
*  WORK STOPS FOR THE WEEKEND AT 1630 HRS FRIDAY
*
       GENERATE   16800,0,11250,,5
       SAVEVALUE  MCSV1,K6300,H
       TERMINATE
*
*
*
*      WORK STOPS FOR TWO DAYS EVERY OTHER WEEK IN DATA
*      PROCESSING ( OR AT 14 DAY INTERVALS) BECAUSE OF
*      ACCUMULATION OF OTHER WORK AREA OVERLOADS
       GENERATE   33600,0,16800,,,0
       SAVEVALUE  MCSV2,K4800,H
*
*      RESET DATA PROC PUNCH WORK STOPAGE OF 2 DAYS BACK TO
*      ZERO AT 14 DAY INTERVALS ALSO.
       ADVANCE    4800
       SAVEVALUE  MCSV2,K0,H
       TERMINATE
*
*
*
*.....................................................................
*  GENERATION OF CUSTOMER REQUISTIONS
*.....................................................................
*
*  DEFINE  FUNCTION TO RANDOMLY SELECT THE NUMBER OF REQNS
```

```
*  DATA SOURCE CUST SVC DIV INPUT FEEDER REPORTS JUN-JUL-AUG
*  SEP 72
*
      1 FUNCTION   RN1,C11       DISTBN OF MONDAY'S INPUT
0,-2500/.067,-2000/.200,-1500/.40,-1000/.533,-500/.667,0/
.733,2500/.800,3500/.867,4000/.933,5000/1.0,6500
*
      2 FUNCTION   RN1,C6        DISTBN OF TUESDAY'S INPUT
0,-3000/.125,-2500/.375,-2000/.625,-1500/.812,-1000/1.0,-500
*
      3 FUNCTION   RN1,C7        DISTBN OF WEDNESDAY'S INPUT
0,-2500/.118,-2000/.471,-1500/.647,-500/.823,0/.941,500/
1.0,2500
*
      4 FUNCTION   RN1,C8        DISTBN OF THURSDAY'S INPUT
0,-2500/.056,-2000/.278,-1500/.566,-1000/.778,-500/.833,500/
.889,1000/1.0,2000
*
      5 FUNCTION   RN1,C9        DISTBN OF FRIDAY'S INPUT
0,-1000/.167,-500/.444,0/.551,500/.722,1000/.778,1500/
.889,2000/.944,2500/1.0,3000
*
      6 FUNCTION   P3,D4         PRIORITY ASSIGNMENT FUNCTION
1,4/2,3/3,2/4,1
*
      7 FUNCTION   P3,D4         PRIORITY SORTING FUNCTION
1,GPA/2,WTHRU/3,GP8/4,GPC
*
      8 FUNCTION   V$DAY,E5      ASSIGN A FUNCTION TO A FNC
1,FN1/2,FN2/3,FN3/4,FN4/5,FN5
*
     11 FUNCTION   RN1,D6        ASSIGNS PACK CODE TO P1
.436,0/.448,1/.560,2/.565,10/.658,20/1.0,21
*
     12 FUNCTION   RN1,D2
.54,1/1.0,4
*  ASSIGNS PICKING TYPE TO THE GP1/WT TRANSACTIONS
*
     14 FUNCTION   RN1,D3
.46,2/.77,3/1.0,7
*  ASSIGNS PICKING TYPE TO THE GP2/GP3 TRANS
*
 GENF1 FUNCTION   RN1,C8        TIME-DEMAND DISTBN
.638,25/.658,50/.732,100/.830,125/.881,275/.896,325/.963,600
*
 GENF3 FUNCTION   P5,D4         ASSIGN ISGP PRIORITIES TO P3
1,1/2,2/3,3/4,4
*  ASSIGN P3=1 TO ISSUE GROUP 1
*  ASSIGN P3=2 TO WALKTHRU'S
*  ASSIGN P3=3 TO ISSUE GROUP 2
*  ASSIGN P3=4 TO ISSUE GROUP 3
*
*
      3 VARIABLE   V$MRSS/210+FN8/10+50
*  COMPUTE RANDOM DAILY INPUT ASSUMMING 21 WORKDAYS PER MON
*
*
*  CREATE THE DAILY REQUISTION INPUT
*
        GENERATE   2400,,750,,,6  REQUISITIONS ARRIVE NSCSD
*                                  0730 HRS, MONDAY THRU FRIDAY
        TEST E     BV$DAYV,K1,KILL  KILL IF SAT OR SUN
        ASSIGN     4,N$DAYG        ASSIGN CREATION DATE TO P4
 TRANX  SPLIT      V3,NEXT         CREATE V3 TRANSACTIONS
  NEXT  ASSIGN     5,FN$GENF2      ASSIGN LOT PRIORITY TO P5
        ASSIGN     3,FN$GENF3      ASSIGN ISGP PRIORITIES IN P3
        PRIORITY   FN6             ASSIGN PRIORITY PER FUNCTION 6
        ASSIGN     1,FN11          ASSIGNS PACKING CODE
        ADVANCE    450,450         DEMANDS ARRIVE UNIFORMLY OVER
        MARK                       THE WORKDAY
        QUEUE      20,10           ALL ACTIVE TRANSACTIONS IN
*                                  THIS QUEUE
```

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         TRANSFER   FN,7          SORT BY PRIORITY
*
 WTHRU   TABULATE   ARRIV
         ASSIGN     2,FN12       ASSIGNS PICKING TYPE TO THE
*                                 WALKTHRU TRANSACTIONS
         TRANSFER   ,EDIT1
*
   GPA   TABULATE   ARRIV
         ASSIGN     2,FN12       ASSIGNS PICKING CODES
         TRANSFER   .V$AUTOI,EDIT1,AUTOD 32.7% ARRIVE VIA AUTO
*
    GPB  ASSIGN     2,FN14
*                                 ASSIGNS PICK TYPE TO P2 TO GP3
*                                 AND GP2 TRANSACTIONS
         TABULATE   ARRIV
         TRANSFER   .V$AUTOI,EDIT1,AUTOD 22.3% ARRIVE VIA AUTO
    GPC  ASSIGN     2,FN14
         TABULATE   ARRIV
         TEST NE    P5,K8,EDIT1 COLD STORAGE REQNS TO EDIT
         TRANSFER   .V$AUTOI,EDIT1,AUTOD 22.3% ARRIVE VIA AUTO
*
*
*
*.....................................................
*  REQUISITIONS RECIEVED VIA AUTODIN
*.....................................................
*
 AUTF1   FUNCTION   P3,D2        GP1'S TO CUST SVC,2,3'S TO CPU
1,NISNC/2,CPU
*
 AUTOD   LINK       AUTO,FIFO
*  UNLINK ALL EVERY TWO HOURS-SEE MESSENGER SECTION
 AUTOT   TRANSFER   FN,AUTF1     GP1'S TO CUST SVC,2,3'S TO CPU
*
*
*.....................................................
*       MESSENGERS PROVIDE INTERDEPARTMENTAL TRANSPORTATION
*.....................................................
*
      5  VARIABLE   C1@2400      CLOCK TIME 0001 TO 2400 HOURS
*
         GENERATE   2400,0,750   GENERATE FLOOR BOSS TO PICK UP
*                                PICKING TICKETS EACH WEEKDAY
*                                MORNING.
         TEST E     BV$DAYV,K1,KILL  KILL IF SAT OR SUN
         UNLINK     CPU,MID,ALL
         TERMINATE
*
         GENERATE   200,0,800    CREATE MESSENGER TO TAKE GP1S
*                                UNLOTTED TO PICKING EVERY 2 HRS
*                                AND TO TAKE GP3S AND GP2S TO
*                                DATA PROCESSING EVERY 2 HOURS.
         TEST GE    V5,K800,KILL  START EACH DAY AT 0800
         TEST LE    V5,K1600,KILL DON'T SEND MESSENGER AFTER
*                                1600 EACH AFTERNOON
         TEST E     BV$DAYV,K1,KILL  KILL IF SAT OR SUN
         UNLINK     1,PICK1,ALL
         UNLINK     2,DAPRA,ALL
         UNLINK     3,FALL,ALL
         UNLINK     AUTO,AUTOT,ALL AUTODIN REQNS DISPATCHED
         TERMINATE  0
*
*
*
*.....................................................
*       CUSTOMER SERVICES EDITING
*.....................................................
*
 EDIT1   QUEUE      EDIT,10      STATISTICS GENERATED FOR TRANS
*                                WAITING TO BE EDITED IN
*                                CUSTOMER SERVICES.  THIS
*                                RECEIVES ALL INPUT LESS AUTO-
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```
*                                   DIN GP2 AND GP3
        SAVEVALUE   10,PR,H
        PRIORITY    0,BUFFER
        PRIORITY    XH10
        GATE SF     EDIT,CSED       TEST IF STORAGE IS FULL.IF
*                                   YES, LINK TRANS TO USER CHAIN
        LINK        EDIT,P3
 CSED   ENTER       EDIT
        DEPART      EDIT,10
        ADVANCE     V14
     14 VARIABLE    XH$MCSV1+V$EDITP
        LEAVE       EDIT
        UNLINK      EDIT,CSED,1
        TEST NE     P5,K8,COLDS KILL COLD STORAGE
 PROC   TRANSFER    FN,9            THIS FUNCTION SENDS BEARER/
*                                   GP1/GP2 TO THE CUSTOMER SER-
*                                   VICE PUNCH, AND SENDS GP3 TRAN
*                                   TO DATA PROCESSING VIA CHAIN
*                                   2 EVERY 2 HOURS
*
     9 FUNCTION    P3,D2
3,CSPUN/4,GREEN
*
*.....................................................
*       PROCESSING OF DEMAND EXCEPTIONS
*.....................................................
*
 DEWRQ QUEUE       DEWR,10         QUEUE FOR DEMAND EXCEPTIONS
*                                   KICKED BACK BY THE COMPUTER
*                                   AND WAREHOUSE REFUSALS FROM
*                                   PICKING
        SAVEVALUE   11,PR,H
        PRIORITY    0,BUFFER
        PRIORITY    XH11
        GATE SF     DEWR,DEWRS
        LINK        DEWR,P3
 DEWRS  ENTER       DEWR
        DEPART      DEWR,10
      6 VARIABLE    XH$MCSV1+V$DEWRP
        ADVANCE     V6
        LEAVE       DEWR
        UNLINK      DEWR,DEWRS,1
 DELAY  TRANSFER    ,PROC           SEND THE INSTOCK  DEWR RE-
*                                   WORKED ITEMS TO APPROPRIATE
*                                   PUNCH AREA
*
*
*.....................................................
*       CUSTOMER SERVICES PUNCH
*.....................................................
*
     15 VARIABLE    XH$MCSV1+V$PUNP
*
 CSPUN  TEST NE     P3,K1,PUN1
        TEST NE     P3,K2,PUN1
        TRANSFER    .V$PREP,PUN1,CPU SEND PREPUNCHED TO CPU
 PUN1   QUEUE       PUNCH,10
        SAVEVALUE   12,PR,H
        PRIORITY    0,BUFFER
        PRIORITY    XH12
        GATE SF     PUNCH,PUN       TEST IF STORAGE IS FULL
        LINK        CSPUN,P3
 PUN    ENTER       PUNCH
        DEPART      PUNCH,10
        ADVANCE     V15
        LEAVE       PUNCH
        UNLINK      CSPUN,PUN,1
 NISNC  TRANSFER    .V$GROSS,TERM,INSTK SEND ONLY THAT % GP1S
*                                   BEARERS, AND GP2S TO PICKING
*                                   THAT IS IN STOCK. KILL
*                                   STOCHASTICALLY.  ASSUME OVER-
*                                   ALL NIS/NC RATE BASED
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*                                   ON GROSS EFFECTIVENESS FROM
*                                   1972 MONTHLY  1144 REPORTS.
 INSTK TRANSFER    FN,10            GP1 AND BEARERS ARE SENT TO
*                                   PICKING SINCE THEY WERE IN-
*                                   PUTED INTO THE COMPUTER WHEN
*                                   PUNCHED. GP2 TRANS ARE SENT TO
*                                   DATA PROCESSING NOW ALREADY
*                                   PUNCHED.
    10 FUNCTION    P3,D3
1,DUM2/2,PICK2/3,WHITE
 PICK2 TRANSFER    .V$NCPER,PICK1,NCPIC SEND THAT % OF WT'S
*                                   AND GP1S THAT SHOULD BE PICKED
 DUM2  TRANSFER    .V$NCPER,DUM3,NCPIC
*
*
 DUM3  LINK        1,FIFO           LINK ALL BROADWAY GP1'S
*                                  UNTIL MESSENGER TAKES THEM TO
*                                  PICKING EVERY TWO HOURS
 DUM1  TRANSFER    ,PICK2           SEND ALL WALKTHRUS TO PICKING
 WHITE LINK        3,FIFO           WAIT FOR MESSENGER TO DELIVER
*                                   HERE EVERY 2 HOURS
*
*
*
*.....................................................
* DATA PROCESSING PUNCH FOR THE GP3S FROM CUSTOMER SERVICES
*.....................................................
*
    16 VARIABLE    XH$MCSV1+XH$MCSV2+V$PUNP
*
 GREEN LINK        2,FIFO           WAIT FOR MESSENGER TO DELIVER
*                                   EVERY 2 HOURS
 DAPRA TRANSFER    .V$PREP,DAPR1,CPU
*                                   1348'S ARE PREPUNCHED.
 DAPR1 QUEUE       DPPUN,10         2 SECTIONS CAN PUNCH
       SAVEVALUE   19,PR,H
       PRIORITY    0,BUFFER
       PRIORITY    XH19
       GATE SF     DAPR,SECT2       TEST IF PUNCH STORAGE IS FULL
       LINK        DPPUN,FIFO
 SECT2 ENTER       DAPR             DATA PROC PUNCH STORAGE
       DEPART      DPPUN,10
       ADVANCE     V16
       LEAVE       DAPR
       UNLINK      DPPUN,SECT2,1
*
*.....................................................
*      CENTRAL PROCESSING UNIT IN DATA PROCESSING
*.....................................................
*
    21 FUNCTION    P2,D3
2,PICK1/3,PICK1/7,NCPIC
*
 CPU   TRANSFER    .V$GROSS,TERM,FALL TERM STOCHASTICALLY
*                                   THAT % OF TRANSACTIONS WHICH
*                                   THE COMPUTER WOULD HAVE CALLED
*                                   NIS/NC.
 COLDS ADVANCE     0                COLD STORAGE ENTERS HERE
 TERM  DEPART      20,10
       TERMINATE
*
 FALL  QUEUE       CPU,10           QUEUE FOR GP2S AND GP3S TO BE
*                                   LOTTED THIS NIGHT.
*
       LINK        CPU,P5           TRANS TO BE LOTTED THIS DAY AT
*                                   NC AND BWDY.AT MIDNIGHT THEY
*                                   ARE LOTTED AND AT 0730 THE
*                                   PICKING TICKETS ARE PICKED UP
*                                   BY THE FLOOR BOSS AND TAKEN
*                                   TO THE WAREHOUSE.
 MID   DEPART      CPU,10
       TRANSFER    .V$DEEX,MID1,DEWRQ SEND DEMAND EXCEPTIONS/
*                                   WAREHOUSE REFUSALS FROM ALL
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*                                   STANDARD STOCK  GP3 AND GP2
*                                   REQUESTS BACK TO CUSTOMER
*                                   SERVICES FOR PROCESSING.
 MID1  TRANSFER    FN,21            SEND TO NC OR BWDY PICKING
*
*.....................................................
*  STORAGE DIVISION-PICKING OPERATION AT BROADWAY
*.....................................................
*
VPIC1 VARIABLE    FN$FPIC1+XH$MCSV1
*  PICKING TIME VARIABLE(VPIC1) = ISSUE TIME(FPIC1) + DELAY
*  TIME(XH1) DUE TO LUNCH BREAKS,OVERNIGHT,AND WEEKENDS
 VPIC3 BVARIABLE  (P5'E'XH$PISV1)*(P4'E'XH$PISV2)
*
*                                   AT NATIONAL CITY
 PICK1 QUEUE       PICK,10         DD1348-1'S ARRIVE EACH MORNING
*                                   AND AWAIT PICKING
       ASSIGN      6,P5
       SAVEVALUE   13,PR,H
       PRIORITY    0,BUFFER
       PRIORITY    XH13
       GATE SF     PICK,PICKA
*
 PICKC LINK        PICK,P5         PLACE TRANS ON CHAIN 'PICK'
*                                   IN LOT NUMBER SEQUENCE
 PICKA ENTER       PICK            WORKMAN TAKES A PICKING TAG
       DEPART      PICK,10
       ADVANCE     V$VPIC1         WORKMAN PICKS ITEM
       LEAVE       PICK            WORKMAN PLACES ITEM ON CONVEYO
       ASSIGN      5,P6
      UNLINK       PICK,PICKA,1  AS A TRANS LEAVES THIS STOR,
*                                   ANOTHER IS ALLOWED TO ENTER
       SAVEVALUE   PISV1,P5,H      STORE THE  VALUE IN PARAM 5
       SAVEVALUE   PISV2,P4,H      STORE THE CREATION DATE
       TEST NE     P3,K1,PACQ      GP1'S DIRECT TO PACKING
       TEST NE     P3,K2,STAB      WALKTHRU'S GO OUT HERE
       TRANSFER    ,PACQ
*
*  CHECK FOR PARTIALLY COMPLETED LOTS AT END OF WORKDAY
*  FINISH ANY PARTIAL LOT BEFORE STARTING A NEW LOT
*
       GENERATE    2400,165C,,,0 THE TIME IS 1630 HOURS
       TEST E      BV$DAYV,K1,KILL  KILL IF SAT OR SUN
       UNLINK      PICK,PICKB,ALL,BV$VPIC3  REMOVE PARTIAL LO
       TERMINATE
 PICKB ADVANCE     1               DELAY PARTIAL LOT 0.01 HRS TO
*                                   AVOID LOOPING
       TEST GE     P3,K3,PICKC
       ASSIGN      5,K3            CHANGE PARTIAL LOT # TO LOT7
*                                   THIS INSURES THIS LOT WILL BE
*                                   COMPLETED THE NEXT WORKDAY
*                                   BEFORE STARTING ON A NEW LOT
*
       TRANSFER    ,PICKC          PLACE PARTIAL LOT BACK ON
*                                   USER CHAIN 2
*
*
*.....................................................
*  PACKING LINE OPERATION AT BROADWAY
*.....................................................
*
PACV1 VARIABLE    FN$PACF1+XH$MCSV1
*
 PACQ  QUEUE       PACK,10
       SAVEVALUE   14,PR,H
       PRIORITY    0,BUFFER
       PRIORITY    XH14
       GATE SF     PACK,PACKA
       LINK        PACK,FIFO
 PACKA ENTER       PACK
       DEPART      PACK,10
       ADVANCE     V$PACV1
```

```
         LEAVE       PACK
         UNLINK      PACK,PACKA,K1,3,K1,PACKU
         TRANSFER    ,MARKQ
  PACKU  UNLINK      PACK,PACKA,1
*
*
*.....................................................
*  MARKING OPERATION AT BROADWAY
*.....................................................
*
  MARKQ  QUEUE       MARK,10
         SAVEVALUE   15,PR,H
         PRIORITY    0,BUFFER
         PRIORITY    XH15
         GATE SF     MARK,MKB1
         LINK        MARK,P3
   MKB1  ENTER       MARK
         DEPART      MARK,10
   MKV1  VARIABLE    FN$MKF1+XH$MCSV1
         ADVANCE     V$MKV1
         LEAVE       MARK
         UNLINK      MARK,MKB1,1
         TEST NE     P1,K0,STAB   PARCEL POST OUT HERE
         TEST NE     P3,K1,STAB   ALL GP1'S OUT HERE
         TRANSFER    ,STAGA
*
*
*.....................................................
*  STORAGE DIVISION-PICKING OPERATION AT NATIONAL CITY
*.....................................................
*
  NPIV3  BVARIABLE   (P5'E'XH$NPSV1)*(P4'E'XH$NPSV2)
*
  NCPIC  QUEUE       NPIC,10      DD1348-1'S ARRIVE EACH MORNING
*                                 AND AWAIT PICKING
         ASSIGN      6,P5
*
         SAVEVALUE   16,PR,H
         PRIORITY    0,BUFFER
         PRIORITY    XH16
         GATE SF     NPIC,NPICA
*
  NPICC  LINK        NPIC,P5         PLACE TRANS ON CHAIN 'NPIC'
*                                 IN LOT NUMBER SEQUENCE
  NPICA  ENTER       NPIC         WORKMAN TAKES A PICKING TAG
         DEPART      NPIC,10
         SAVEVALUE   NPSV1,P5,H   STORE THE  VALUE IN PARAM 5
         SAVEVALUE   NPSV2,P4,H   STORE THE CLOCK TIME
         ADVANCE     V$VPIC1      WORKMAN PICKS ITEM
         LEAVE       NPIC         WORKMAN PLACES ITEM ON CONVEYO
         ASSIGN      5,P6
       UNLINK        NPIC,NPICA,1  AS A TRANS LEAVES THIS STOR,
*                                 ANOTHER IS ALLOWED TO ENTER
         TEST NE     P3,K1,NPAQ   GP1'S DIRECT TO PACKING
         TEST NE     P3,K2,STAB   WALKTHRU'S GO OUT HERE
         TRANSFER    ,NPAQ
*
*   CHECK FOR PARTIALLY COMPLETED LOTS AT END OF WORKDAY
*
         GENERATE    2400,165C,,,0 THE TIME IS 1630 HOURS
         TEST E      BV$DAYV,K1,KILL  KILL IF SAT OR SUN
         UNLINK      NPIC,NPICB,ALL,BV$NPIV3  REMOVE PARTIAL LO
         TERMINATE
  NPICB  ADVANCE     1            DELAY PARTIAL LOT 0.01 HRS TO
*                                 AVOID LOOPING
         TEST GE     P3,K3,NPICC
         ASSIGN      5,K3         CHANGE PARTIAL LOT # TO LOT7
*                                 THIS INSURES THIS LOT WILL BE
*                                 COMPLETED THE NEXT WORKDAY
*                                 BEFORE STARTING ON A NEW LOT
*
         TRANSFER    ,NPICC       PLACE PARTIAL LOT BACK ON
```

```
*                                USER CHAIN 2
*
*
*
*.....................................................
*  PACKING LINE AT NATIONAL CITY
*.....................................................
*
 NPAF2 FUNCTION   RN1,D6       ASSIGN PACK CODE TC P1 (N/C)
.377,2/.631,20/.756,1/.826,10/.999,0/1.0,21
*
 NPAQ  QUEUE      NPAC,10
       ASSIGN     1,FN$NPAF2
       SAVEVALUE  17,PR,H
       PRIORITY   0,BUFFER
       PRIORITY   XH17
       GATE SF    NPAC,NPACA
       LINK       NPAC,P3
 NPACA ENTER      NPAC
       DEPART     NPAC,10
       ADVANCE    V$PACV1
       LEAVE      NPAC
       UNLINK     NPAC,NPACA,1
*
*
*.....................................................
*  MARKING OPERATION AT NATIONAL CITY
*.....................................................
*
 NMKV1 VARIABLE   FN$NMKF1+XH$MCSV1
*
       QUEUE      NMAR,10
       SAVEVALUE  18,PR,H
       PRIORITY   0,BUFFER
       PRIORITY   XH18
       GATE SF    NMAR,NMKB1
       LINK       NMAR,P3
 NMKB1 ENTER      NMAR
       DEPART     NMAR,10
       ADVANCE    V$NMKV1
       LEAVE      NMAR
       UNLINK     NMAR,NMKB1,1
       TEST NE    P1,K0,STAB  PARCEL POST OUT HERE
       TEST NE    P3,K1,STAB  ALL GP1'S OUT HERE
*
*
*.....................................................
*  STAGING OPERATION
*.....................................................
*
 STAF4 FUNCTION   P3,D4
1,IGP1/2,BEAR/3,IGP2/4,IGP3
*
*  ZONE DELIVERY SYSTEM
*
*  MONDAY  DELIVER TO ZONES 7,9,1,2,5 IN THAT PRIORITY
*  TUESDAY DELIVER TO ZONES 6,8,3,9,4 IN THAT PRIORITY
*  WEDNESDAY DELIVER TO ZONES 7,8,9,5 IN THAT PRIORITY
*  THURSDAY  DELIVER TO ZONES 9,1,2 IN THAT PRIORITY
*  FRIDAY  DELIVER TO ZONES 6,8,3,9,4 IN THAT PRIORITY
*  TRANSPORTATION HAS CAPABILITY OF MOVING 4300 L/I'S PER DA
*  DATA SOURCE-LOCAL OPERATING PROCEDURES AS OF 20DEC72
*
 STAFM FUNCTION   V$STAV1,D5
1,27/2,26/3,27/4,29/5,26
 STAFT FUNCTION   V$STAV1,D5
1,29/2,28/3,28/4,21/5,28
 STAFW FUNCTION   V$STAV1,D5
1,21/2,23/3,29/4,22/5,23
 STATH FUNCTION   V$STAV1,D5
1,22/2,29/3,25/4,24/5,29
 STAFF FUNCTION   V$STAV1,D5
1,25/2,24/3,30/4,30/5,24
```

```
*
 STAV1 VARIABLE   N$GENS1@7   DAY COUNT, 1 THRU 7
*
 TRUCK VARIABLE   18*V$DRIVE  EACH DRIVER IS CAPABLE OF DE-
*  LIVERING 360 LINE ITEMS PER 8-HOUR SHIFT(ROUGH ESTIMATE)
*
 STAGA ASSIGN     2,FN$STAF1  ASSIGN DELIVERY ZONE TO P2
       QUEUE      STAGE,10
 STAGL LINK       *2,FIFO     STORE BY DELIVERY ZONE ON
*                              FIFO-IN,FIRST-OUT BASIS, USER
*                              CHAINS 21 THRU 30
 GENS1 GENERATE   2400,,800   DELIVER TO ONE ZONE EACH MORN.
       TEST E     BV$DAYV,K1,KILL  KILL IF SAT OR SUN
       UNLINK     FN$STAFM,TRANS,ALL
       UNLINK     FN$STAFT,TRANS,ALL
       UNLINK     FN$STAFW,TRANS,ALL
       UNLINK     FN$STATH,TRANS,ALL
       UNLINK     FN$STAFF,TRANS,ALL
       UNLINK     CHAIN,STAD,V$TRUCK
       ADVANCE    500          IT IS NOW AFTERNOON (1300HRS)
       UNLINK     CHAIN,STAD,V$TRUCK
       UNLINK     CHAIN,STAGL,ALL
       TERMINATE
 TRANS LINK       CHAIN,FIFO
  STAD DEPART     STAGE,10
  STAB TABULATE   TIME
       DEPART     20,10
       TRANSFER   FN,STAF4
  BEAR TABULATE   WTHRU
       TRANSFER   ,OUT2A
  IGP1 TABULATE   IGP1
       TEST LE    M1,K7200,OUT  3-SHIFT PROCESSING OF GP1'S
*                              IS EQUIV TO 72 SIMUL HOURS
  OUT1 TRANSFER   ,OUT
  IGP2 TABULATE   IGP2
 OUT2A TEST LE    M1,K7200,OUT
  OUT2 TRANSFER   ,OUT
  IGP3 TABULATE   IGP3
       TEST LE    M1,K26400,OUT
  OUT3 ADVANCE    0            DUMMY BLOCK
   OUT TERMINATE
*
**
*.....................................................
*  LIST OF TABLES IN PROGRAM
*.....................................................
**
*  DISTRIBUTION OF QUEUE DELAY TIMES (QTABLES)
 EDIT  QTABLE     EDIT,0,100,10
 PUNCH QTABLE     PUNCH,0,100,10
 DEWR  QTABLE     DEWR,0,100,10
 DPPUN QTABLE     DPPUN,0,100,10
 CPU   QTABLE     CPU,0,1200,10
 PICK  QTABLE     PICK,0,100,10
 PACK  QTABLE     PACK,0,100,10
 MARK  QTABLE     MARK,0,100,10
 NPIC  QTABLE     NPIC,0,100,10
NPAC   QTABLE     NPAC,0,100,10
 NMAR  QTABLE     NMAR,0,100,10
 STAGE QTABLE     STAGE,0,2400,16
*
   12  VARIABLE   M1/2400
 ARRIV TABLE      V58,700,50,21
  TIME TABLE      M1,0,2400,16
 WTHRU TABLE      M1,0,2400,10
  IGP1 TABLE      M1,0,2400,10
  IGP2 TABLE      M1,0,2400,16
  IGP3 TABLE      M1,0,2400,16
*
   SUN TABLE      V$ARRV1,0,500,20
   MON TABLE      V$ARRV1,0,500,20
```

```
    TUE TABLE       V$ARRV1,0,500,20
    WED TABLE       V$ARRV1,0,500,20
    THU TABLE       V$ARRV1,0,500,20
    FRI TABLE       V$ARRV1,0,500,20
    SAT TABLE       V$ARRV1,0,500,20
   WEEK TABLE       V$ARRV1,0,500,20
*
*
*.....................................................................
*   THRU-PUT COMPUTATION SECTION
*.....................................................................
*
52      FVARIABLE   (TB$TIME+(1645*TD$TIME/1000))/24
 53     FVARIABLE   (TB$IGP2+(1645*TD$IGP2/1000))/24
 54     FVARIABLE   (TB$IGP3+(1645*TD$IGP3/1000))/24
 55     VARIABLE    TB$TIME/24
 56     VARIABLE    TB$IGP2/24
 57     VARIABLE    TB$IGP3/24
 58     VARIABLE    C1@2400
*
        GENERATE    16800,0,16799
        SAVEVALUE   52,V52
        SAVEVALUE   53,V53
        SAVEVALUE   54,V54
        SAVEVALUE   55,V55
        SAVEVALUE   56,V56
        SAVEVALUE   57,V57
        TERMINATE
*
*
*.....................................................................
*   ARRIVAL DISTRIBUTION OF DEMANDS
*.....................................................................
*
  ARR1 FUNCTION    V$DAY,D7
0,SUN/1,MON/2,TUE/3,WED/4,THU/5,FRI/6,SAT
*
 ARRV1 VARIABLE    10*(N$NEXT-X31)
*
        GENERATE    2400,,2399  TABULATE DAILY DEMANDS
        TABULATE    WEEK
        TRANSFER    FN,ARR1
    SUN TABULATE    SUN
        TRANSFER    ,ARRIV
    MON TABULATE    MON
        TRANSFER    ,ARRIV
    TUE TABULATE    TUE
        TRANSFER    ,ARRIV
    WED TABULATE    WED
        TRANSFER    ,ARRIV
    THU TABULATE    THU
        TRANSFER    ,ARRIV
    FRI TABULATE    FRI
        TRANSFER    ,ARRIV
    SAT TABULATE    SAT
  ARRIV SAVEVALUE   31,N$NEXT
        TRANSFER    ,KILL
*
*.....................................................................
*   STORAGE UTILIZATION COMPUTATION SECTION
*.....................................................................
*
*   AVERAGE UTILIZATION OF STORAGE CAPACITY=(AVG CONTENTS)
*            DIVIDED BY (STORAGE CAPACITY)
*
*   COMPUTE AVERAGE CONTENTS BY RANDOM SAMPLING OVER THE
*   EIGHT-HOUR WORKDAY
*
        GENERATE    2400,0,750,,5
        TEST E      BV$DAYV,K1,KILL  KILL IF SAT OR SUN
        SPLIT       10,UTILC
        SPLIT       10,UTILD
```

```
          TERMINATE
 UTILC    ADVANCE     200,200
          TRANSFER    ,UTILA
 UTILD    ADVANCE     700,200
 UTILA    ASSIGN      1,K10
 UTILS    SAVEVALUE   *1+,S*1
          LOOP        1,UTILS
          TERMINATE
*
*  AVERAGE  UTILIZATION OF CAPACITY
 UTIV2    FVARIABLE   X*1*100/((S*1+R*1)*N$UTILA)
*
*  COMPUTE THE PRODUCTION FACILITY RATE
 PRODR    VARIABLE    100*SC*1/(8*N$COUNT*(S*1+R*1))
*
          GENERATE    16800,0,16799  COMPUTE STORAGE UTIL WEEKLY
          ASSIGN      1,K10
          ASSIGN      2,K40
          ASSIGN      3,K70
 UTILB    SAVEVALUE   *2,V$UTIV2,H
          SAVEVALUE   *3,V$PRODR,H
          ASSIGN      2-,K1
          ASSIGN      3-,K1
          LOOP        1,UTILB
    49    VARIABLE    2*XH64       VERIF AND KEY-PUNCH PROD RATE
          SAVEVALUE   10,V49,H
          TERMINATE
*
*.....................................................................
*  SUPPLY DISTRIBUTION AND INVENTORY CONTROL REPORT SECTION
*.....................................................................
*
    31    VARIABLE    V33*106/100
    32    VARIABLE    V31-V33
    33    VARIABLE    210*N$NEXT/N$COUNT
    34    VARIABLE    0
    35    VARIABLE    0
    36    VARIABLE    0
    37    VARIABLE    V42+V43+V44
    38    VARIABLE    0
    39    VARIABLE    210*N$PROC/N$COUNT
    40    VARIABLE    0
    41    VARIABLE    1000*V40/V39
    42    VARIABLE    210*N$IGP1/N$COUNT
    43    VARIABLE    210*(N$IGP2+N$BEAR)/N$COUNT
    44    VARIABLE    210*(N$IGP3+N$COLDS)/N$COUNT
    45    VARIABLE    1000*N$CUT1/N$IGP1
    46    VARIABLE    1000*N$OUT2/N$OUT2A
    47    VARIABLE    1000*N$OUT3/N$IGP3
*
          GENERATE    16800,0,16799  COMPUTE REPORT WEEKLY
          ASSIGN      1,K11
          ASSIGN      2,K31
          ASSIGN      3,K17
 SDICR    SAVEVALUE   *1,V*2
          ASSIGN      1+,K1
          ASSIGN      2+,K1
          LOOP        3,SDICR
          TERMINATE
```

```
*.....
*  OUTPUT EDITOR
*.....
*
*  ****CAUTION**** IF RESET OPTION IS USED, SET ALL FULL
*  WORD SAVEVALUES TO ZERO(I.E.,'INITIAL     X1-X60,0')
       START      4,NP
       RESET
       INITIAL    X1-X60,0
       START      24,,8
*
       REPORT
*
       EJECT
       SPACE      8
 15    TEXT       .....X
.......
 18    TEXT       SUPPLY DISTRIBUTION AND INVENTORY CONTROL REPORT(4000X
)
 32    TEXT       NAVSUP FORM 1144 (MONTHLY)
 15    TEXT       .....X
.......
*
*
 15    TEXT       ****AVAILABILITY ACTIVITY MATERIAL****
*
 15    TEXT       TOTAL MATERIAL REQUESTS,LINE ITEMS        (01)       X
 #X11,2/XXXXXX#
*
 15    TEXT       EXCLUDED FROM FURTHER COMPUTATION         (02)       X
 #X12,2/XXXXXX#
*
 15    TEXT       MATERIAL REQUESTS FOR STD STOCK ITEMS     (03)       X
 #X13,2/XXXXXX#
*
 15    TEXT       STANDARD STOCK ITEMS NOT CARRIED          (04)       X
 #X14,2/XXXXXX#
*
 15    TEXT       NET MATL REQUESTS FOR STD STOCK ITEMS     (05)       X
 #X15,2/XXXXXX#
*
 15    TEXT       STANDARD STOCK ITEMS NOT IN STOCK         (06)       X
 #X16,2/XXXXXX#
*
 15    TEXT       ISSUES OF STANDARD STOCK ITEMS            (07)       X
 #X17,2/XXXXXX#
*
 15    TEXT       ACTIVITY NET MATERIAL AVAILABILITY        (08)       X
```

```
  #X18,2/1LXXXX#%
*
 15     TEXT        POINT OF ENTRY MATL REQUESTS FCR STD STK  (09)        X
 #X19,2/XXXXXX#
*
 15     TEXT        POINT OF ENTRY ISSUES OF STD STOCK        (10)        X
 #X20,2/XXXXXX#
*
 15     TEXT        ACTIVITY POINT OF ENTRY AVAILABILITY      (11)        X
  #X21,2/1LXXXX#%
*
*
 15     TEXT        ****ISSUES BY GROUP****
*
 15     TEXT        TOTAL ISSUES-GROUP 1                      (18)        X
 #X22,2/XXXXXX#
*
 15     TEXT        TOTAL ISSUES-GROUP 2                      (19)        X
 #X23,2/XXXXXX#
*
 15     TEXT        TOTAL ISSUES-GROUP 3                      (20)        X
 #X24,2/XXXXXX#
*
*
 15     TEXT        ****ISSUE PROCESSING ANALYSIS****
*
 15     TEXT        PERCENTAGE SHIPPED ON TIME-ISSUE GROUP 1  (22)        X
  #X25,2/1LXXXX#%
*
 15     TEXT        PERCENTAGE SHIPPED ON TIME-ISSUE GROUP 2  (23)        X
  #X26,2/1LXXXX#%
*
 15     TEXT        PERCENTAGE SHIPPED ON TIME-ISSUE GROUP 3  (24)        X
  #X27,2/1LXXXX#%
*
*
        EJECT
 15     TEXT        ..................................................X
.......
 31     TEXT        ANALYSIS OF THROUGH-PUT TIME
 30     TEXT        NAVAL SUPPLY CENTER,SAN DIEGO
 15     TEXT        ..................................................X
.......
        SPACE       3
 15     TEXT        ****ALL ISSUE GROUPS****
        SPACE       2
 15     TEXT        THE AVERAGE TIME TO PROCESS A SUPPLY REQUEST (I.E.,FRX
CM
```

```
 15     TEXT        RECEIPT TO ISSUE) WAS #X55,2/2LXX.XX# DAYS
        SPACE       2
 15     TEXT        95% OF ALL SUPPLIES WERE ISSUED WITHIN #X52,2/2LXX.XXX
# DAYS
        SPACE       2
 15     TEXT        THE AVERAGE NUMBER OF SUPPLY REQUESTS IN PROCESS(I.E.X
.BACK-
 15     TEXT        LOG) WITHIN THE SYSTEM WAS #Q2C,3/XXXXX#
        SPACE       3
 15     TEXT        ****PRIORITY ISSUE GROUP 2****
        SPACE       2
 15     TEXT        THE AVERAGE TIME TO PROCESS AN ISSUE GROUP 2 REQUEST
 15     TEXT        (I.E.,FROM RECEIPT TO ISSUE) WAS #X56,2/2LXX.XX# DAYS
        SPACE       2
 15     TEXT        95% OF ALL ISSUE GROUP 2'S WERE ISSUED WITHIN #X53,2/X
2LXX.XX# DAYS
        SPACE       3
 15     TEXT        ****PRIORITY ISSUE GROUP 3****
        SPACE       2
 15     TEXT        THE AVERAGE TIME TO PROCESS AN ISSUE GROUP 3 REQUEST
 15     TEXT        (I.E.,FROM RECEIPT TO ISSUE) WAS #X57,2/2LXX.XX# DAYS
        SPACE       2
 15     TEXT        95% OF ALL ISSUE GROUP 3'S WERE ISSUED WITHIN #X54,2/X
2LXX.XX# DAYS
        SPACE       4
 15     TEXT        ***ISSUED IS DEFINED AS (1) DELIVERED OR PICKED-UP,
 15     TEXT        OR (2) RELEASED TO POSTAL SERVICE, OR (3) RELEASED
 15     TEXT        TO TRANSPORTATION IF NON-LOCAL
*
        EJECT
        SPACE       8
 15     TEXT        .....X
.......
 23     TEXT        FREQUENCY DISTRIBUTION OF MEAN DAILY DEMANDS
 30     TEXT        NAVAL SUPPLY CENTER,SAN DIEGO
 15     TEXT        .....X
.......
        SPACE       3
        GRAPH       TB,SUN,SAT,,
        ORIGIN      57,19
        X           SYM,4,3
        Y           0,1000,11,5
 14     STATEMENT   1,11,MEAN DEMAND
        ENDGRAPH
*
*
        EJECT
        SPACE       12
```

```
 10     TEXT          ..........................................................X
.....................................
 32     TEXT          ASSUMED DISTRIBUTION OF DAILY DEMAND ARRIVALS
 39     TEXT          NAVAL SUPPLY CENTER,SAN DIEGO
 10     TEXT          ..........................................................X
.....................................
        SPACE         3
        GRAPH         TP,ARRIV,,.
        ORIGIN        37,13
        X             ,3,1,700,,21,NO
        Y             0,5,7.5
 9      STATEMENT     1,12,FREQUENCY(%)
 14     STATEMENT     38,84,0700    0800    0900    1000    1100    1200    1
 1300     1400      1500    1600    1700
 40     STATEMENT     40,23,TIME OF ARRIVALS(HOURS)
        ENDGRAPH
*
        EJECT
        SPACE         8
 15     TEXT          ..........................................................X
.......
 27     TEXT          SUMMARY DATA ON NSC-SD WORK CENTERS
 29     TEXT          AVERAGE UTILIZATION OF CAPACITY
 43     TEXT          AND
 27     TEXT          AVERAGE REQUISITION THROUGH-PUT TIME
 15     TEXT          ..........................................................X
.......
        SPACE         3
 15     TEXT          WORK CENTER                    UTILIZATION    THRU-PUT TIX
ME(HRS)
 15     TEXT          -----------                    -----------    ----------X
-------
*
 15     TEXT          CUSTOMER SERVICE EDITING              #XH31,2/XX#%      X
          #Q1,7/2LXXX.XX#
        SPACE         2
 15     TEXT          DEMAND EXCEPTION UNIT                 #XH32,2/XX#%      X
          #Q2,7/2LXXX.XX#
        SPACE         2
 15     TEXT          CUSTOMER SERVICE KEY-PUNCH            #XH33,2/XX#%      X
          #Q3,7/2LXXX.XX#
        SPACE         2
 15     TEXT          DATA PROCESSING KEY-PUNCH             #XH34,2/XX#%      X
          #Q4,7/2LXXX.XX#
        SPACE         2
 15     TEXT          CENTRAL PROCESSING UNIT                                 X
#Q5,7/2LXXXX.XX#
        SPACE         2
```

```
 15     TEXT         BROADWAY PICKING OPERATION          #XH35,2/XX#%      X
          #Q6,7/2LXXX.XX#
        SPACE        2
 15     TEXT         BROADWAY PACKING OPERATION          #XH37,2/XX#%      X
          #Q7,7/2LXXX.XX#
        SPACE        2
 15     TEXT         BROADWAY MARKING OPERATION          #XH39,2/XX#%      X
          #Q8,7/2LXXX.XX#
        SPACE        2
 15     TEXT         NATICNAL CITY PICKING OPERATION     #XH36,2/XX#%      X
          #Q9,7/2LXXX.XX#
        SPACE        2
 15     TEXT         NATICNAL CITY PACKING OPERATION     #XH38,2/XX#%      X
          #Q10,7/2LXXX.XX#
        SPACE        2
 15     TEXT         NATICNAL CITY MARKING OPERATICN     #XH40,2/XX#%      X
          #Q11,7/2LXXX.XX#
        SPACE        2
 15     TEXT         TRANSPORTATION STAGING AREA                           X
 #Q12,7/2LXXX.XX#
        SPACE        3
 15     TEXT         TOTAL SYSTEM THRU-PUT TIME OF ISSUES                  X
#T$TIME,3/2LXXXX.XX#
*
        EJECT
        SPACE        12
 10     TEXT         ..................................................X
.....................................
 31     TEXT         FREQUENCY DISTRIBUTION OF REQUISITION TOTAL THRU-PUT X
TIME
 48     TEXT         ****ALL ISSUE GROUPS****
 10     TEXT         ..................................................X
.....................................
        SPACE        3
        GRAPH        TP,TIME,,.
        ORIGIN       37,13
         X            ,4,1,0,,16,NO
        Y            0,10,7,5
 9      STATEMENT    1,12,FREQUENCY(%)
 18     STATEMENT    38,75,0    1    2    3    4    5    6    7    8    9 1
  10    11   12   13   14   >14
 40     STATEMENT    40,32,TOTAL SYSTEM THRU-PUT TIME(DAYS)
        ENDGRAPH
*
        EJECT
        SPACE        12
 10     TEXT         ..................................................X
.....................................
```

```
 31     TEXT        FREQUENCY DISTRIBUTION OF REQUISITION TOTAL THRU-PUT X
TIME
 44     TEXT        ****ISSUE PRIORITY GROUP TWO****
 10     TEXT        ..................................................X
.....................................
        SPACE       3
        GRAPH       TP,IGP2,,.
        ORIGIN      37,13
         X           ,4,1,0,,16,NO
        Y           0.10,7.5
 9      STATEMENT   1,12,FREQUENCY(%)
 18     STATEMENT   38,75,0    1    2    3    4    5    6    7    8    9 1
  10    11   12   13   14  >14
 40     STATEMENT   40,32,TOTAL SYSTEM THRU-PUT TIME(DAYS)
        ENDGRAPH
*
        EJECT
        SPACE       12
 10     TEXT        ..................................................X
.....................................
 31     TEXT        FREQUENCY DISTRIBUTION OF REQUISITION TOTAL THRU-PUT X
TIME
 43     TEXT        *****ISSUE PRIORITY GROUP THREE****
 10     TEXT        ..................................................X
.....................................
        SPACE       3
        GRAPH       TP,IGP3,,.
        ORIGIN      37,13
         X           ,4,1,0,,16,NO
        Y           0,10,7,5
 9      STATEMENT   1,12,FREQUENCY(%)
 18     STATEMENT   38,75,0    1    2    3    4    5    6    7    8    9 1
  10    11   12   13   14  >14
 40     STATEMENT   40,32,TOTAL SYSTEM THRU-PUT TIME(DAYS)
        ENDGRAPH
*
        EJECT
        SPACE       12
 10     TEXT        ..................................................X
.....................................
 27     TEXT        FREQUENCY DISTRIBUTION OF TRANSPORTATION STAGING AREAX
THRU-PUT TIME
 40     TEXT        (DELAY AWAITING TRANSPORTION)
 10     TEXT        ..................................................X
.....................................
        SPACE       3
        GRAPH       TP,STAGE,,.
        ORIGIN      37,13
```

```
         X          .4,1,0.,16.NO
         Y          0,10,7,5
 9       STATEMENT  1,12,FREQUENCY(%)
 18      STATEMENT  38,75,0    1    2    3    4    5    6    7    8    9 1
  10     11   12   13   14  >14
 40      STATEMENT  40,29,AWAITING TRANSPORTATION(DAYS)
         ENDGRAPH
*
         EJECT
         SPACE      8
 15      TEXT       ..................................................X
.......
 33      TEXT       STATISTICS AND ANALYSIS
 32      TEXT       CUSTOMER SERVICE EDITING
 15      TEXT       ..................................................X
.......
         SPACE      3
 15      TEXT       ****QUEUE STATISTICS****
*
 15      TEXT       THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCX
ESSED
 15      TEXT       (I.E.,QUEUE LENGTH) WAS #Q1,3/XXXX.XX#
*
 15      TEXT       THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITX
Y
 15      TEXT       TO BE PROCESSED WAS #Q1,7/2LXXX.XX# HOURS
*
 15      TEXT       THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND
 15      TEXT       IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS #Q1,X
6/XXX.X#%
*
*
 15      TEXT       ****FACILITY STATISTICS****
*
 15      TEXT       THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO TX
HIS
 15      TEXT       FACILITY WAS #S1,8/XX#
*
 15      TEXT       THE PRODUCTION RATE WAS #XH61,2/1LXXX.X# REQUISITIONSX
 PER MAN-HOUR
*
 15      TEXT       THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS #XHX
31,2/XX#%
         SPACE      2
 15      TEXT       ..................................................X
.......
*
 15      TEXT       FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME INX
```

```
 QUEUE)
        SPACE       2
        GRAPH       TP,EDIT,,.
        ORIGIN      32,19
        X           ,4,1,0,,10,NO
        Y           0,20,5,6
 15     STATEMENT   1,12,FREQUENCY(%)
 24     STATEMENT   33,46,0    1    2    3    4    5    6    7    8   >8
 33     STATEMENT   35,24,QUEUE WAITING TIME-HOURS
        ENDGRAPH
*
        EJECT
        SPACE       8
 15     TEXT        ....................................................X
.......
 33     TEXT        STATISTICS AND ANALYSIS
 34     TEXT        DEMAND EXCEPTION UNIT
 15     TEXT        ....................................................X
.......
        SPACE       3
 15     TEXT        ****QUEUE STATISTICS****
*
 15     TEXT        THE AVERAGE NUMBER OF REQUISITICNS WAITING TO BE PROCX
ESSED
 15     TEXT        (I.E.,QUEUE LENGTH) WAS #Q2,3/XXXX.XX#
*
 15     TEXT        THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITX
Y
 15     TEXT        TO BE PROCESSED WAS #Q2,7/2LXXX.XX# HOURS
*
 15     TEXT        THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND
 15     TEXT        IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS #Q2,X
6/XXX.X#%
*
*
 15     TEXT        ****FACILITY STATISTICS****
*
 15     TEXT        THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO TX
HIS
 15     TEXT        FACILITY WAS #S2,8/XX#
*
 15     TEXT        THE PRODUCTION RATE WAS #XH62,2/1LXXX.X# REQUISITIONSX
 PER MAN-HOUR
*
 15     TEXT        THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS #XHX
32,2/XX#%
        SPACE       2
 15     TEXT        ....................................................X
```

```
.......
*
 15     TEXT        FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME INX
 QUEUE)
        SPACE       2
        GRAPH       TP,DEWR,..
        ORIGIN      32,19
        X           ,4,1,0,,10,NO
        Y           0,20,5,6
 15     STATEMENT   1,12,FREQUENCY(%)
 24     STATEMENT   33,46,0    1    2    3    4    5    6    7    8   >8
 33     STATEMENT   35,24,QUEUE WAITING TIME-HOURS
        ENDGRAPH
*
        EJECT
        SPACE       8
 15     TEXT        ..................................................X
.......
 33     TEXT        STATISTICS AND ANALYSIS
 32     TEXT        CUSTOMER SERVICE KEY-PUNCH
 15     TEXT        ..................................................X
.......
        SPACE       3
 15     TEXT        ****QUEUE STATISTICS****
*
 15     TEXT        THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCX
ESSED
 15     TEXT        (I.E.,QUEUE LENGTH) WAS #Q3,3/XXXX.XX#
*
 15     TEXT        THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITX
Y
 15     TEXT        TO BE PROCESSED WAS #Q3,7/2LXXX.XX# HOURS
*
 15     TEXT        THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND
 15     TEXT        IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS #Q3,X
6/XXX.X#%
*
*
 15     TEXT        ****FACILITY STATISTICS****
*
 15     TEXT        THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO TX
HIS
 15     TEXT        FACILITY WAS #S3,8/XX#
*
 15     TEXT        THE PRODUCTION RATE WAS #XH63,2/1LXXX.X# REQUISITIONSX
 PER MAN-HOUR
*
 15     TEXT        THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS #XHX
```

```
33.2/XX#%
        SPACE       2
 15     TEXT        ..................................................X
.......
*
 15     TEXT        FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME INX
 QUEUE)
        SPACE       2
        GRAPH       TP,PUNCH,,.
        ORIGIN      32,19
        X           ,4,1,0,,10,NO
        Y           0,20,5,6
 15     STATEMENT   1,12,FREQUENCY(%)
 24     STATEMENT   33,46,0    1    2    3    4    5    6    7    8   >8
 33     STATEMENT   35,24,QUEUE WAITING TIME-HOURS
        ENDGRAPH
*
        EJECT
        SPACE       8
 15     TEXT        ..................................................X
.......
 33     TEXT        STATISTICS AND ANALYSIS
 24     TEXT        DATA PROCESSING KEY-PUNCH AND VERIFICATION
 15     TEXT        ..................................................X
.......
        SPACE       3
 15     TEXT        ****QUEUE STATISTICS****
*
 15     TEXT        THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCX
ESSED
 15     TEXT        (I.E.,QUEUE LENGTH) WAS #Q4,3/XXXX.XX#
*
 15     TEXT        THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITX
Y
 15     TEXT        TO BE PROCESSED WAS #Q4,7/2LXXX.XX# HOURS
*
 15     TEXT        THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND
 15     TEXT        IMMEDIATELY PROCESSED (I.E..NO WAITING TIME) WAS #Q4,X
6/XXX.X#%
*
*
 15     TEXT        ****FACILITY STATISTICS****
*
 15     TEXT        THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO TX
HIS
 15     TEXT        FACILITY WAS #S4,8/XX#
*
 15     TEXT        THE PRODUCTION RATE WAS #XH10,2/1LXXX.X# REQUISITIONSX
```

```
 PER MAN-HOUR
*
 15     TEXT        THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS #XHX
34.2/XX#%
        SPACE       2
 15     TEXT        ..................................................X
.......
*
 15     TEXT        FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME INX
 QUEUE)
        SPACE       2
        GRAPH       TP,DPPUN,,,
        ORIGIN      32,19
        X           ,4,1,0,,10,NO
        Y           0,20,5,6
 15     STATEMENT   1,12,FREQUENCY(%)
 24     STATEMENT   33,46,0    1    2    3    4    5    6    7    8    >8
 33     STATEMENT   35,24,QUEUE WAITING TIME-HOURS
        ENDGRAPH
*
        EJECT
        SPACE       8
 15     TEXT        ..................................................X
.......
 33     TEXT        STATISTICS AND ANALYSIS
 32     TEXT        BROADWAY PICKING OPERATION
 15     TEXT        ..................................................X
.......
        SPACE       3
 15     TEXT        ****QUEUE STATISTICS****
*
 15     TEXT        THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCX
ESSED
 15     TEXT        (I.E.,QUEUE LENGTH) WAS #Q6,3/XXXX.XX#
*
 15     TEXT        THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITX
Y
 15     TEXT        TO BE PROCESSED WAS #Q6,7/2LXXX.XX# HOURS
*
 15     TEXT        THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND
 15     TEXT        IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS #Q6,X
6/XXX.X#%
*
*
 15     TEXT        ****FACILITY STATISTICS****
*
 15     TEXT        THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO TX
HIS
```

```
 15     TEXT        FACILITY WAS #S5,8/XX#
*
 15     TEXT        THE PRODUCTION RATE WAS #XH65,2/1LXXX.X# REQUISITIONSX
 PER MAN-HOUR
*
 15     TEXT        THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS #XHX
35,2/XX#%
        SPACE       2
 15     TEXT        ..................................................X
.......
*
 15     TEXT        FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME INX
 QUEUE)
        SPACE       2
        GRAPH       TP,PICK,,.
        ORIGIN      32,19
        X           ,4,1,0.,10,NO
        Y           0,20,5,6
 15     STATEMENT   1,12,FREQUENCY(%)
 24     STATEMENT   33,46,0    1    2    3    4    5    6    7    8   >8
 33     STATEMENT   35,24,QUEUE WAITING TIME-HOURS
        ENDGRAPH
*
        EJECT
        SPACE       8
 15     TEXT        ..................................................X
.......
 33     TEXT        STATISTICS AND ANALYSIS
 29     TEXT        NATIONAL CITY PICKING OPERATION
 15     TEXT        ..................................................X
.......
        SPACE       3
 15     TEXT        ****QUEUE STATISTICS****
*
 15     TEXT        THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCX
ESSED
 15     TEXT        (I.E.,QUEUE LENGTH) WAS #Q9,3/XXXX.XX#
*
 15     TEXT        THE AVERAGE TIME A REQUISITICN WAITED AT THIS FACILITX
Y
 15     TEXT        TO BE PROCESSED WAS #Q9,7/2LXXX.XX# HOURS
*
 15     TEXT        THE PROPORTION OF TIME THAT A REQUISITICN ARRIVED AND
 15     TEXT        IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS #Q9,X
6/XXX.X#%
*
*
 15     TEXT        ****FACILITY STATISTICS****
```

```
*
 15     TEXT        THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO TX
HIS
 15     TEXT        FACILITY WAS #S6,8/XX#
*
 15     TEXT        THE PRODUCTION RATE WAS #XH66,2/1LXXX.X# REQUISITIONSX
 PER MAN-HOUR
*
 15     TEXT        THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS #XHX
36.2/XX#%
        SPACE       2
 15     TEXT        ..................................................X
.......
*
 15     TEXT        FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING T IME INX
 QUEUE)
        SPACE       2
        GRAPH       TP,NPIC,,.
        ORIGIN      32,19
        X           ,4,1,0,,10,NC
        Y           0,20,5,6
 15     STATEMENT   1,12,FREQUENCY(%)
 24     STATEMENT   33,46,0    1    2    3    4    5    6    7    8    >8
 33     STATEMENT   35,24,QUEUE WAITING TIME-HOURS
        ENDGRAPH
*
        EJECT
        SPACE       8
 15     TEXT        ..................................................X
.......
 33     TEXT        STATISTICS AND ANALYSIS
 32     TEXT        BROADWAY PACKING OPERATION
 15     TEXT        ..................................................X
.......
        SPACE       3
 15     TEXT        ****QUEUE STATISTICS****
*
 15     TEXT        THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCX
ESSED
 15     TEXT        (I.E.,QUEUE LENGTH) WAS #Q7,3/XXXX.XX#
*
 15     TEXT        THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITX
Y
 15     TEXT        TO BE PROCESSED WAS #Q7,7/2LXXX.XX# HOURS
*
 15     TEXT        THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND
 15     TEXT        IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS #Q7,X
6/XXX.X#%
```

```
*
*
 15     TEXT        ****FACILITY STATISTICS****
*
 15     TEXT        THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO TX
HIS
 15     TEXT        FACILITY WAS #S7,8/XX#
*
 15     TEXT        THE PRODUCTION RATE WAS #XH67,2/1LXXX.X# REQUISITIONSX
 PER MAN-HOUR
*
 15     TEXT        THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS #XHX
37,2/XX#%
        SPACE       2
 15     TEXT        ..................................................X
.......
*
 15     TEXT        FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME INX
 QUEUE)
        SPACE       2
        GRAPH       TP,PACK,,.
        ORIGIN      32,19
        X           .4,1,0.,10,NO
        Y           0,20,5,6
 15     STATEMENT   1,12,FREQUENCY(%)
 24     STATEMENT   33,46,0    1    2    3    4    5    6    7    8   >8
 33     STATEMENT   35,24,QUEUE WAITING TIME-HOURS
        ENDGRAPH
*
*
        EJECT
        SPACE       8
 15     TEXT        ..................................................X
.......
 33     TEXT        STATISTICS AND ANALYSIS
 29     TEXT        NATIONAL CITY PACKING OPERATION
 15     TEXT        ..................................................X
.......
        SPACE       3
 15     TEXT        ****QUEUE STATISTICS****
*
 15     TEXT        THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCX
ESSED
 15     TEXT        (I.E.,QUEUE LENGTH) WAS #Q10,3/XXXX.XX#
*
 15     TEXT        THE AVERAGE TIME A REQUISITICN WAITED AT THIS FACILITX
Y
 15     TEXT        TO BE PROCESSED WAS #Q10,7/2LXXX.XX# HOURS
```

```
*
 15     TEXT        THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND
 15     TEXT        IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS #Q10X
.6/XXX.X#%
*
*
 15     TEXT        ****FACILITY STATISTICS****
*
 15     TEXT        THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO TX
HIS
 15     TEXT        FACILITY WAS #S8,8/XX#
*
 15     TEXT        THE PRODUCTION RATE WAS #XH68,2/1LXXX.X# REQUISITIONSX
 PER MAN-HOUR
*
 15     TEXT        THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS #XHX
38.2/XX#%
        SPACE       2
 15     TEXT        ....................................................X
.......
*
 15     TEXT        FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME INX
 QUEUE)
        SPACE       2
        GRAPH       TP,NPAC,,,
        ORIGIN      32,19
        X           ,4,1,0,,10,NO
        Y           0,20,5,6
 15     STATEMENT   1,12,FREQUENCY(%)
 24     STATEMENT   33,46,0    1    2    3    4    5    6    7    8   >8
 33     STATEMENT   35,24,QUEUE WAITING TIME-HOURS
        ENDGRAPH
*
        EJECT
        SPACE       8
 15     TEXT        ....................................................X
.......
 33     TEXT        STATISTICS AND ANALYSIS
 32     TEXT        BROADWAY MARKING OPERATION
 15     TEXT        ....................................................X
.......
        SPACE       3
 15     TEXT        ****QUEUE STATISTICS****
*
 15     TEXT        THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCX
ESSED
 15     TEXT        (I.E.,QUEUE LENGTH) WAS #Q8,3/XXXX.XX#
*
```

```
 15     TEXT        THE AVERAGE TIME A REQUISITICN WAITED AT THIS FACILITX
Y
 15     TEXT        TO BE PROCESSED WAS #Q8,7/2LXXX.XX# HOURS
*
 15     TEXT        THE PROPORTION OF TIME THAT A REQUISITION ARRIVED AND
 15     TEXT        IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS #Q8,X
6/XXX.X#%
*
*
 15     TEXT        ****FACILITY STATISTICS****
*
 15     TEXT        THE NUMBER OF PERSONNEL ASSIGNED AS DIRECT LABOR TO TX
HIS
 15     TEXT        FACILITY WAS #S9,8/XX#
*
 15     TEXT        THE PRODUCTION RATE WAS #XH69,2/1LXXX.X# REQUISITIONSX
 PER MAN-HOUR
*
 15     TEXT        THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS #XHX
39,2/XX#%
        SPACE       2
 15     TEXT        ..................................................X
.......
*
 15     TEXT        FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME INX
 QUEUE)
        SPACE       2
        GRAPH       TP,MARK,,,
        ORIGIN      32,19
        X           .4,1,0,,10,NO
        Y           0,20,5,6
 15     STATEMENT   1,12,FREQUENCY(%)
 24     STATEMENT   33,46,0    1    2    3    4    5    6    7    8   >8
 33     STATEMENT   35,24,QUEUE WAITING TIME-HOURS
        ENDGRAPH
*
        EJECT
        SPACE       8
 15     TEXT        ..................................................X
.......
 33     TEXT        STATISTICS AND ANALYSIS
 29     TEXT        NATIONAL CITY MARKING OPERATION
 15     TEXT        ..................................................X
.......
        SPACE       3
 15     TEXT        ****QUEUE STATISTICS****
*
 15     TEXT        THE AVERAGE NUMBER OF REQUISITIONS WAITING TO BE PROCX
```

```
ESSED
 15     TEXT        (I.E.,QUEUE LENGTH) WAS #Q11,3/XXXX.XX#
*
 15     TEXT        THE AVERAGE TIME A REQUISITION WAITED AT THIS FACILITX
Y
 15     TEXT        TO BE PRCCESSED WAS #Q11,7/2LXXX.XX# HOURS
*
 15     TEXT        THE PROPCRTION OF TIME THAT A REQUISITION ARRIVED AND
 15     TEXT        IMMEDIATELY PROCESSED (I.E.,NO WAITING TIME) WAS #Q11X
.6/XXX.X#%
*
*
 15     TEXT        ****FACILITY STATISTICS****
*
 15     TEXT        THE NUMBER OF PERSCNNEL ASSIGNED AS DIRECT LABOR TO TX
HIS
 15     TEXT        FACILITY WAS #S10,8/XX#
*
 15     TEXT        THE PRODUCTION RATE WAS #XH70,2/1LXXX.X# REQUISITIONSX
 PER MAN-HOUR
*
 15     TEXT        THE AVERAGE UTILIZATION RATE OF THIS FACILITY WAS #XHX
40.2/XX#%
        SPACE       2
 15     TEXT        ..................................................X
.......
*
 15     TEXT        FREQUENCY DISTRIBUTION OF DELAY TIME (WAITING TIME INX
 QUEUE)
        SPACE       2
        GRAPH       TP,NMAR,,.
        ORIGIN      32,19
        X           ,4,1,0,,10,NO
        Y           0,20,5,6
 15     STATEMENT   1,12,FREQUENCY(%)
 24     STATEMENT   33,46,0    1    2    3    4    5    6    7    8   >8
 33     STATEMENT   35,24,QUEUE WAITING TIME-HOURS
        ENDGRAPH
*
        OUTPUT
        END
```

LIST OF REFERENCES

1. Prichard, J. W., and Bussell, H. G., A Proposed Concept for Allocating Resources in Accordance with General Objectives No. 1 and No. 2, 24/25 February 1969.

2. Prichard, J. W., Productivity and Throughput Time, 10 July 1969

3. NSC, San Diego, Supply Distribution and Inventory Control Report (4000) NAVSUP FORM 1144 (Monthly), Jan-Dec 1972

4. NSC, San Diego, Defense Integrated Management Engineering Systems (DIMES) Methods Engineering Survey Handbooks, 1968-1970

5. NSC, San Diego, Customer Services Monthly Input Feeder Reports, June-Sept 1972

6. NSC, San Diego, Data Processing Key Punch Record Content Sheets, June-Sept 1972

7. NSC, San Diego, Transportation Study, 1971

8. OPNAVINST 4614.1D, Uniform Material Movement and Issue Priority System (UMMIPS), 22 June 1971

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ABSTRACT

A computer model which simulates the processing of requisitions for standard stock material at NSC San Diego is constructed. The model is designed to enable NSC San Diego to determine those work stations which are bottlenecks and to view the effects of changes in total throughput time caused by changes in manpower resources and administrative procedures. Output from the computer simulation model includes an analysis of throughput time by issue priority group, and summary data on work center utilizations and delay times. Total throughput time is compared to Uniform Material Movement and Issue Priority System time standards. The automated materials handling system seems to achieve its goals; however large delays are seen to occur in the staging area where items await local transportation. These delays are reflected most critically in the statistics for the percentage of issue priority group two material shipped on time. Variations of the basic model were analyzed. The combination of a six day workweek and an increased local delivery schedule resulted in substantial improvement.

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PROCESSING TIME						
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